Washington Coastal Geodetic Control Network: Report and Station Index

Developed in Support of the Southwest Washington Coastal Erosion Study

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SECTION 1: THE WASHINGTON COASTAL GEODETIC CONTROL PROJECT

1. Background Information

The Southwest Washington Coastal Erosion Study is a multidisciplinary effort aimed at measuring, describing, and modeling the natural and human factors that impact the shorelines of the Columbia River littoral cell (Kaminsky *et al.* 1997). The littoral cell is 165 km in length and extends from Point Grenville, Washington in the north, to Tillamook Head, Oregon in the south (Figure 1).

To measure temporal and regional variations within this highly dynamic system, a beach morphology monitoring program has been implemented to document short- to medium-term shoreline variability (event – seasonal – annual scale) within the littoral cell (Ruggiero *et al.* 1998; Ruggiero *et al.* 1999). The monitoring program utilizes Global Positioning System (GPS) technologies to obtain sub-decimeter measurements of beach change at sampling sites distributed throughout the study area.

To obtain the sub-decimeter accuracy's required by this monitoring effort, a high precision vertical and horizontal control network was developed (Kaminsky *et al.* 1998). This geodetic network supports the use of both real-time-kinematic (RTK) and geodetic GPS survey technologies.

The network has been designed to support data collection and provide a common reference datum and coordinate system for the multiple agencies involved in the study. The geodetic control network supports quantitative shoreline mapping, topographic and bathymetric surveying, surface elevation modeling, aerial photo orthorectification, ground-truthing of remote sensing operations, and a multitude of local uses, including point positioning and feature delineation.

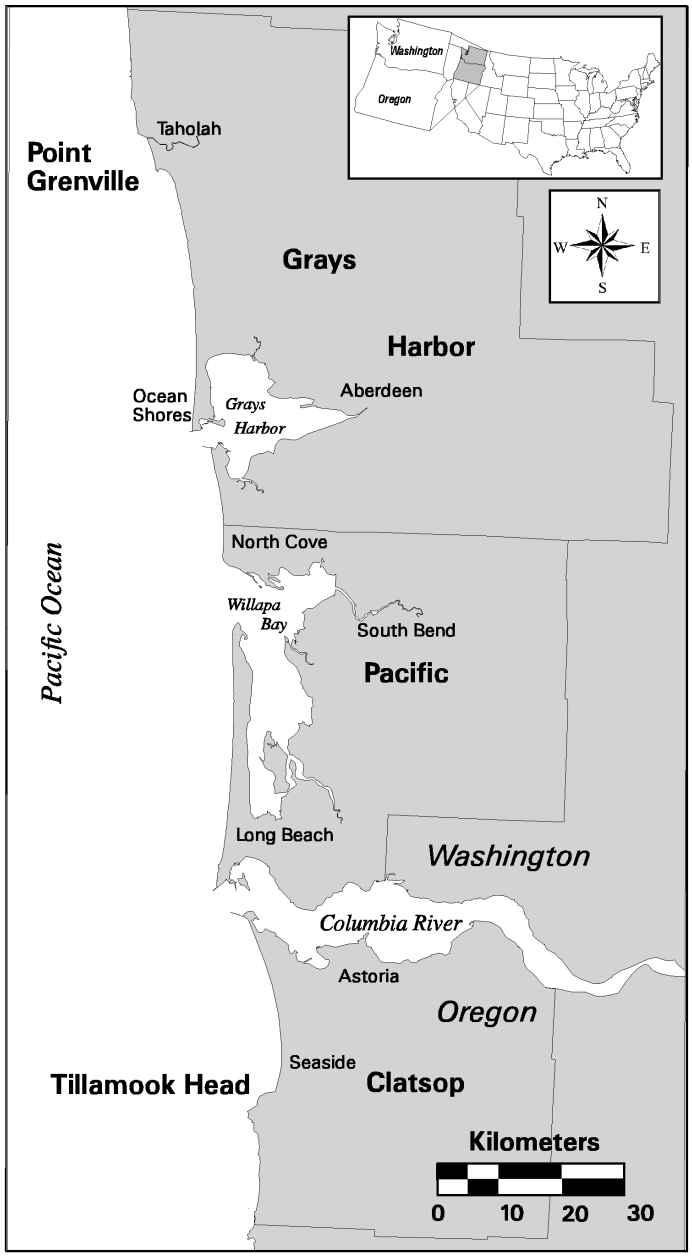

Figure 1. The Columbia River littoral cell extends 165 km from Tillamook Head, Oregon, to Point Grenville, Washington and includes portions of Grays Harbor, Pacific, and Clatsop counties.

The geodetic control network described here, was developed by the Washington Department of Ecology (Ecology) with assistance from the National Geodetic Survey (NGS), US Geological Survey (USGS), Washington Department of Transportation (WS DOT) and the US Army Corps of Engineers (COE). The design process involved the identification, description, retrieval, and field recovery of over 140 survey markers within the region. Of the existing survey markers, 62 were selected for inclusion in the network and 14 new survey markers were installed. The seventy-six stations shown in Figure 2 comprise the Washington Coastal Geodetic Control (WCGC) Network.

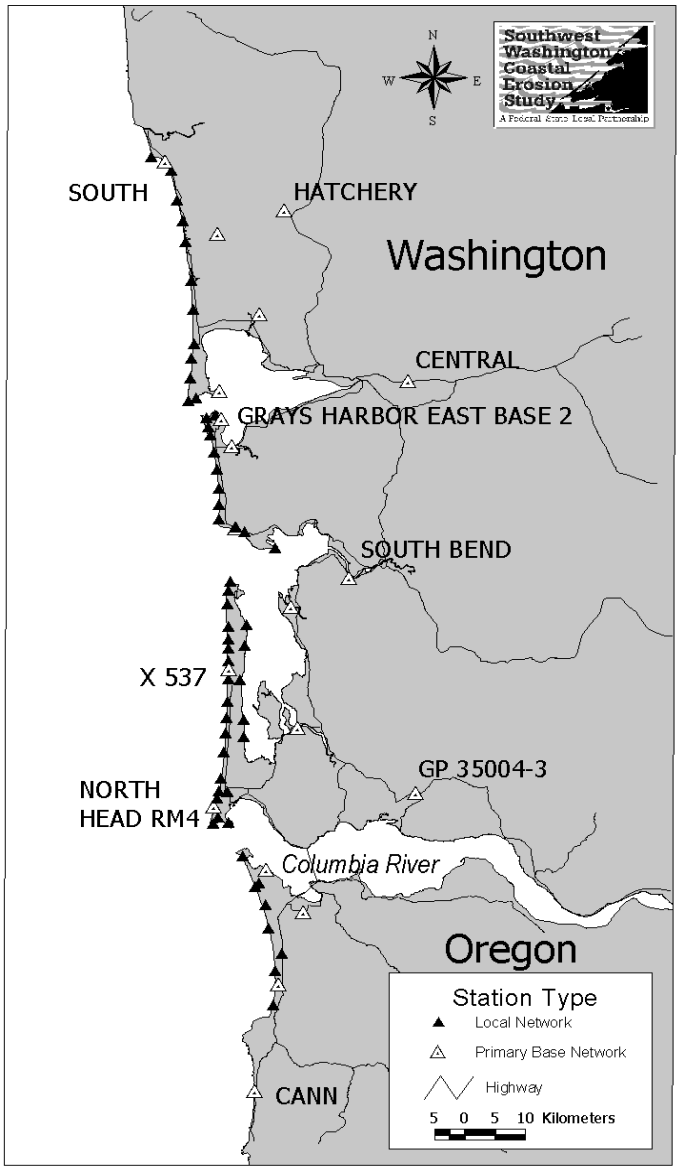

Figure 2. Regional overview of the Washington Coastal Geodetic Control Network with primary and local network stations identified. Names shown in this figure are for the nine High Accuracy Reference Network stations within the network.

2. Existing Vertical and Horizontal Control

Background investigation for developing the network started in early 1996 and involved the identification of suitable vertical and horizontal control stations within the study area. Stations considered for inclusion in the network were not limited to stations currently in the NGS database. Stations installed by the COE, WS DOT, Oregon Department of Transportation (OR DOT), Pacific County, the City of Ocean Shores, and National Ocean Service (NOS) were all considered.

The description of each station was reviewed and the station selected or rejected for possible inclusion in the network based on its accessibility, GPS visibility, and the distance between adjacent stations. The desired spacing of stations along the ocean coast was driven by the requirements of the RTK-GPS survey system being used by the study for the beach morphology monitoring program. The RTK-GPS system required stations along the coast with published NAVD 88 elevations that were less than 7 kilometers apart.

Vertical stability factors (e.g., stainless steel rod vs. surface mark), and station order and class, were also considered in the selection process. During the initial review approximately 140 markers were identified as potential candidates for the network. This review identified three areas on the coast, Pacific Beach to Ocean Shores, WA; North Cove to Westport, WA; and Hammond to Seaside, OR, where new monuments would be needed to achieve the desired station spacing.

In the case of the Pacific Beach-Ocean Shores area, a distance of 35 kilometers, there were no benchmarks referenced to the NAVD 88 datum. In the North Cove-Westport (20 km) and Hammond-Seaside (30 km) areas, the only NAVD 88 benchmarks available were located from three to five kilometers inland. The lack of vertical control near the coast in 52% of the study area was a driving factor that compelled the Department of Ecology to enter into a cooperative agreement with the NGS to design and implement the Washington Coastal Geodetic Control Network.

3. Network Design and Implementation

The goals for establishing a GPS-derived vertical control network along the southwest Washington and northwest Oregon coast include the following:

1. Establish a GPS derived 2 cm-level local horizontal and vertical control network based on NGS guidelines[1].
2. Develop a base datum to which all coastal change data could be referenced.
3. Document the network to NGS standards.
4. Publish the survey in the NGS National Spatial Reference System database.

The network was designed to support of the Southwest Washington Coastal Erosion Study as well as to enhance the National Spatial Reference System (NSRS) along the coast of Washington and northern Oregon.

Ecology employed NGS approved procedures for the survey, explained in Guidelines for Establishing GPS-Derived Ellipsoid Heights (Zilkoski *et al.* 1997). As part of the cooperative agreement with the NGS, Ecology performed all field reconnaissance and provided station descriptions, sketches, maps, and other information to the NGS for their approval. Ecology, with the assistance of the USGS, provided field personnel and performed all GPS observations using dual-frequency full-wavelength GPS receivers.

This project consisted of four parts: first, site reconnaissance and the selection and/or installation of suitable stations for inclusion in the network; second, planning, scheduling, and coordinating equipment and personnel for the field phase of the project; third, conducting the field observations; and fourth, data processing, "blue-booking"; and lastly, submission of the data to the NGS for final adjustment.

The following subsections describe the first three parts of this project. The fourth part of the project is described in further detail in Section 4. Section 4 contains a reprint of the NGS *Report of Horizontal Control & Vertical Computations* and describes the procedures followed by the NGS during the final adjustment of the data.

3.1 Site Reconnaissance

During January 1997 through June 1997 over 100 stations were visited in conjunction with beach topographic surveys conducted by Ecology. In addition, four field trips were conducted to recover survey stations that were candidates for inclusion in the network and to identify locations where new monuments were required.

[1] The NGS guidelines used by the survey required that the primary base stations be within 40 km of their neighboring base stations. The spacing between secondary and primary base stations in the primary base network could not exceed 15 km. Within the local network, the distance between adjacent stations could not exceed 10 km, with an average spacing of less than or equal to 7 km (Zilkoski *et al.* 1997).

Based on these site visits and the needs of the Southwest Washington Coastal Erosion Study (i.e., maximum distance between adjacent stations along the coast) it was determined that a total of seventy-six stations would be needed to cover the study area. This number included fourteen new stations as well as 33 NGS or NOS stations, 5 COE stations, 15 Pacific County stations, 4 WS DOT stations, 2 OR DOT stations, 2 USGS stations, and 1 City of Ocean Shores station.

Nine of the NGS stations included in the network, shown in Figure 2, are part of the Washington or Oregon High Accuracy Reference Network (HARN). The HARN was developed by the NGS with the collaboration of state agencies, counties, cities, utilities, tribes, and private entities. HARN stations have internally consistent horizontal coordinates that are of B order (1 cm, +1:1,000,000) or higher.

3.2 Preliminary Field Operations

Several new geodetic quality vertical control monuments were sited along the coast where existing station spacing did not meet either NGS or the study requirements. Thirteen stations were sited and described by Ecology and installed by a team of NGS and Ecology personnel in June 1997. A fourteenth station, MCKENZIE HEAD RM 3, was installed in November 1997 by Ecology in Fort Canby State Park for better GPS visibility. This station replaced station MCKENZIE HEAD in the network.

Thus, a total of fourteen new stations were installed in 1997. Seven stations were installed in Grays Harbor County, Washington, three in Pacific County, Washington, and four in Clatsop County, Oregon. One NGS station was reset (MEADOW RESET). The location and names of the stations included in the network are shown in Figures 3, 4, and 5.

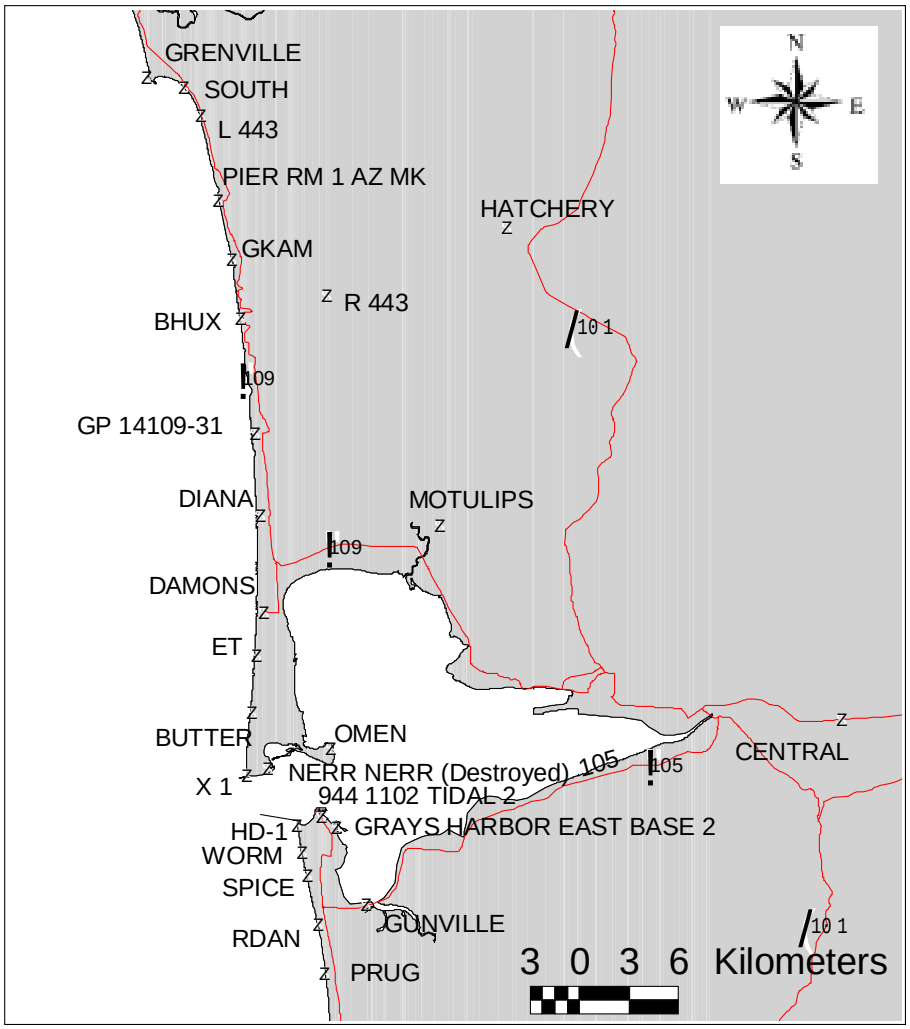

Figure 3. **Map showing the location of network stations within Grays Harbor County, Washington.**

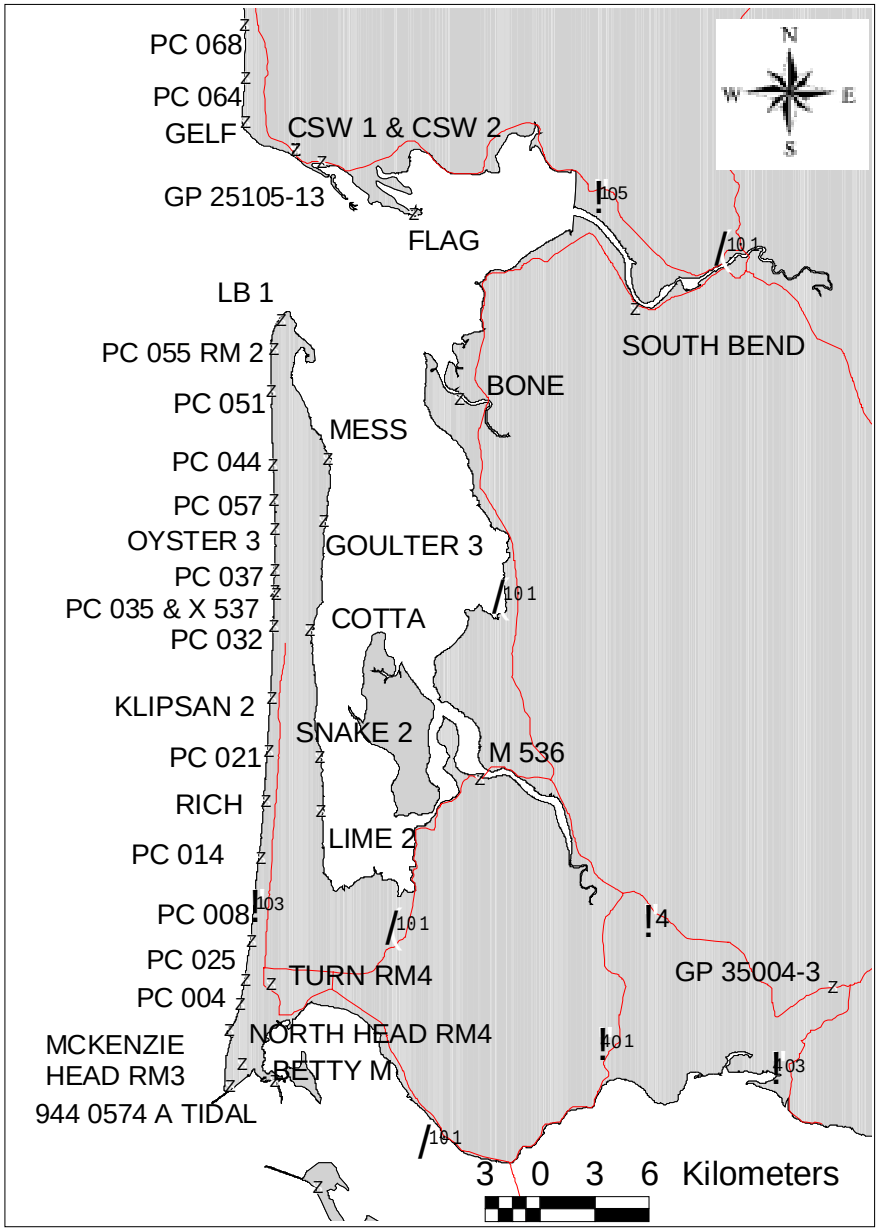

Figure 4. **Map showing the location of network stations within Pacific and Wahkiakum County, Washington.**

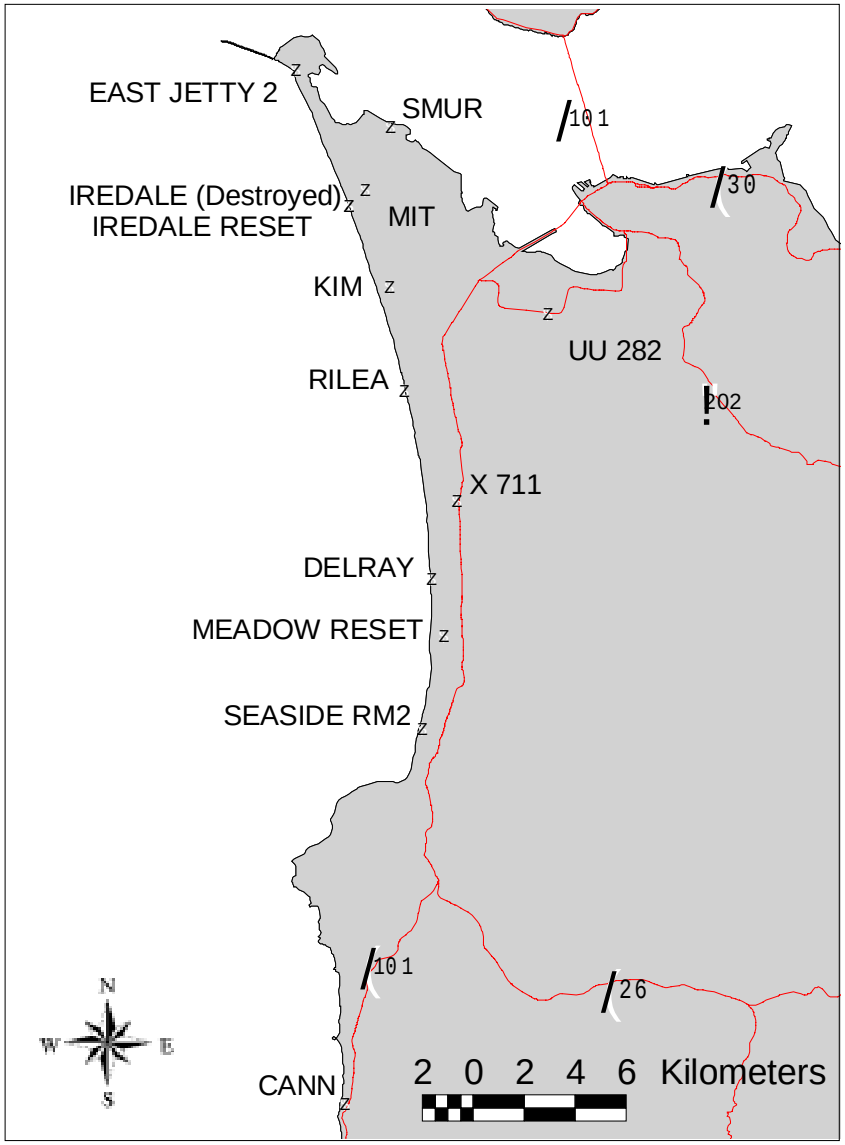

Figure 5. **Map showing the location of network stations within Clatsop County, Oregon.**

3.3 Survey Operations

The size of the project area (about 165-km in length) and the desire to complete the field phase of this project during the summer of 1997 required that the GPS observations be conducted in an organized field campaign over two weeks. The observation plan involved two phases. Phase 1 involved the observation of each station in the primary base network with six-hour sessions over two or three days[2]. Phase 2 involved observing the local network. The local network included the fourteen secondary base stations and the fifty-seven local network stations. Each station in the local network was observed on two different days with forty-five minute sessions.

Personnel
Ecology contributed four operators and provided the field coordination for the project. The USGS provided four operators and, in the second week, a dedicated data coordinator who was involved with the transfer and analysis of the Ashtech GPS data into RINEX for use by GPSurvey (Trimble Ltd.) —the data analysis software utilized by Ecology for this project. GPS observations were conducted by Tom Reiss, Ann Gibbs, Jennifer Horsman, and Eric Hansen (USGS); Richard Daniels, Peter Ruggiero, Bob Huxford, Diana McCandless, George Kaminsky and Brian Voigt (Ecology); Dale Barrett and Russell Barrett (HLB & Associates, Seaside, Oregon).

Coordination
To insure coordination between the Department of Ecology, USGS, HLB & Associates, Grays Harbor County, Pacific County, and the NGS during the field phase, a meeting was held July 20, 1997 in Hoquiam, Washington. This meeting covered all aspects of the project and included discussion of the NGS standards and specifications for documenting the GPS observations, as well as a discussion of the field instructions and procedures developed by Ecology for this project.

Equipment
The size of the project area required the use of dual-frequency, full-wavelength GPS receivers. This campaign utilized eight GPS receivers with 2-meter fixed height tripods. Ecology provided two Trimble 4400 receivers and one fixed height tripod. Ecology coordinated with the USGS office in Menlo Park, California, to obtain six Ashtech Z-12 receivers and seven fixed height tripods for the survey. Efforts were undertaken to obtain trained operators and receivers from Grays Harbor County and the Washington Department of Transportation. However, budgetary and time constraints precluded their employment in this project. A private survey company, HLB & Associates, Seaside, Oregon, volunteered two Trimble 4400 receivers with wood tripods and tribachs to observe stations CANN and MEADOW RESET in northwest Oregon.

The guidelines for establishing GPS-derived ellipsoid heights (Zilkoski *et al.* 1997) required meteorological data (wet bulb, dry bulb, relative humidity, and air pressure) be collected at the primary and secondary base stations. Efforts were made to obtain these instruments through the

[2]The primary base network consisted of five primary (HATCHERY, CENTRAL, SOUTH BEND, GP 35004-3, CANN) and fourteen secondary control stations (SOUTH, R 443, MOTULIPS, OMEN, GRAYS HARBOR EAST BASE 2, GUNVILLE, CSW 1, BONE, X 537, M 536, NORTH HEAD RM 4, SMUR, UU 282, MEADOW RESET).

Department of Ecology, the Washington State NGS advisor, NGS Seattle field office, and the USGS. This process resulted in the loan of four full meteorological stations and a fifth air pressure sensor —two less than required by the guidelines. To overcome this limitation the meteorological stations were distributed such that the primary base stations would always have meteorological data. The remaining meteorological stations were distributed among the secondary base stations to insure pressure and weather variations between coastal and inland locations would be well represented.

Procedures

Each operator was assigned a GPS receiver, antenna, and tripod along with a receiver number. This number was permanently assigned to each set of equipment for the duration of the project. Each operator was given a binder that included spotter maps and site descriptions for all 76 stations, meteorological station assignments by receiver number and station, and a day-by-day schedule showing the start and end time for each session. The receiver number was used in all scheduling and insured that all field personnel would know where and when they should have their assigned GPS receivers operational.

During the pre-project meeting (held on July 20th) all 2-meter fixed height tripods were inspected and their bubbles plumed using two three-wire levels provided by the Washington State NGS advisor. Each equipment configuration was setup and run for 15 to 20 minutes and the antenna heights measured. Serial and model numbers for each receiver/antenna set were recorded as the equipment was repacked and batteries recharged in preparation for the start of phase 1 of the project on July 21, 1997.

Observations, Phase 1, 2, and 3

A majority of the observations were conducted over two weeks in two phases. Phase 1 involved a subset of eighteen stations. Phase 2 involved the observation of seventy-one stations. Phase 3 involved observations to tie in MCKENZIE HEAD RM 3 and the reobservation of several stations whose adjusted baselines were not within NGS specifications.

Phase 1 of the field operation ran from July 21 through July 25, 1997 and involved observation of the five primary and fourteen secondary control stations. Each session ran from 9:00 a.m. to 3:00 p.m., and used a 10-degree mask with a 15-second epoch interval. Due to the movement of a tripod leg at station CANN, near Cannon Beach, Oregon, a makeup session was held on August 2. The makeup session observed station CANN and its six nearest primary and secondary control stations.

Phase 2 of the field operation ran from July 27 through August 1, 1997 and involved observations at the fourteen secondary stations and fifty-seven local network stations. Each session ran for 45-minutes and used a 15-degree mask with a 15-second epoch interval.

After initial adjustment of the survey data by Weber GPS Consultants it was determined that several baselines were not within NGS specifications and that one station, MCKENZIE HEAD, did not have suitable GPS visibility.

As a result of these findings, station MCKENZIE HEAD RM 3 was installed by Ecology in November 1997 for better GPS visibility. Phase 3 data collection was conducted between December 1997 and January 1998 to tie MCKENZIE HEAD RM 3 to the network and to observe other out-of-specification baselines. Additional observations were carried out on September 29-30, 1998 to replace station IREDALE, which had been destroyed by vandals. The new station, named IREDALE RESET, is located at approximately the same location as the original. These sessions ran for 45-minutes and used a 15-degree mask with a 15-second epoch interval, the same as used for the phase 2 observations.

3.4 Adjustment of the Data

Ecology and Weber GPS Consultants conducted preliminary formatting and review of the survey data prior to submission to the NGS. All of the data were converted from their native formats (proprietary Trimble or Ashtech formats) to a standard data interchange format, RINEX. During this conversion any problems with antenna phase centers and correct antenna heights were rectified. Data quality was also reviewed at this time via an initial check of each survey session for cycle slips and proper session start and stop times. Baseline distances were calculated to insure that baseline misclosures between neighboring stations were less than 2 cm, the NGS standard for surveys of this type. The NGS software program DDPROC was run and station descriptions created or updated for each station in the network. Once this initial review was completed, all the data was sent to the NGS for adjustment. Along with the digital data, Ecology furnished the NGS with station photographs and/or rubbings, observation logs, station visibility diagrams and a final equipment list and field report (Daniels and Ruggiero 1997).

The Washington Coastal Geodetic Control Network was reviewed by the National Geodetic Survey (NGS) and final adjustment completed in December 1998. The three primary steps taken by the NGS to adjust the data are explained in the following paragraphs. For detailed information on the NGS adjustment procedures see Section 4.

In the first step the primary base network was adjusted. During this adjustment the horizontal coordinates of the nine HARN stations and two CORS stations were held fixed. During the calculation of the NAD 83 ellipsoid heights the heights of the two CORS stations (FORT STEVENS 1 ARP and ROBINSON POINT 1 ARP) were held fixed. The adjustment of the primary base network produced horizontal and NAD 83 ellipsoid heights for the secondary and primary base stations.

In the second step of the adjustment process the local network was adjusted. Since the secondary stations are common to both the primary and local network, the secondary stations served as the fixed horizontal and NAD 83 ellipsoid control for the adjustment.

The third step was to estimate the NAVD 88 orthometric heights for the non-benchmark stations in the network. In the combined vertical adjustment, the orthometric height of the following stations with known NAVD 88 orthometric heights were held fixed: 944 0574 A TIDAL, 944 1102 TIDAL 2 1952, FLAG, GUNVILLE, L 443, M 536, MESS, R 443, SOUTH, SOUTH BEND, TURN RM 4, and X 537.

The results from this three step process for the Washington Coastal Geodetic Control Network are shown in Table 1, where internally consistent coordinates for stations over 161 km apart are shown. The NAVD 88 elevations in Table 1 are shown to the accuracy of the data, leveled benchmarks are shown to millimeters while GPS stations are shown to centimeters in Washington and decimeters in Oregon. The coordinates shown in Table 1 meet NGS local 2-cm ellipsoid height standards. In addition, the horizontal coordinates shown meet B-order horizontal specifications (1 cm, ±1:1,000,000) for the primary base stations and first-order specifications (1 cm, ±1:100,000) for stations in the local network.

Table 1. Coordinates for the seventy-six stations contained within the Washington Coastal Geodetic Control Network in the Washington State Plane, South, meters, NAD 83 and NAVD 88 coordinate systems.

Station Number	County	NGS PID	Station Designation	Station	NAD 83 (1991)		NAVD 88 Elevation
				Type	Easting (m)	Northing (m)	(m)
01	Grays Harbor	SD0794	GRENVILLE	Local	214355.081	225915.358	37.63
02	Grays Harbor	SD0132	SOUTH	Secondary	216603.847	225290.033	4.643
03	Grays Harbor	SD0129	L 443	Local	217632.452	223555.901	6.86
04	Grays Harbor	SD0780	PIER RM 1 AZ MK	Local	218706.174	218480.556	7.13
05	Grays Harbor	SY5644	HATCHERY	Primary	236150.840	216822.073	36.537
06	Grays Harbor	AH6996	GKAM	Local	219509.529	214862.915	7.16
07	Grays Harbor	SD0117	R 443	Secondary	225227.546	212765.386	32.988
08	Grays Harbor	AH6997	BHUX	Local	220002.033	211327.432	5.96
09	Grays Harbor	AH6998	GP 14109-31	Local	220961.222	204470.295	7.34
10	Grays Harbor	AH6999	DIANA	Local	221227.901	199520.997	6.01
11	Grays Harbor	SD0720	MOTULIPS	Secondary	232060.108	198880.826	15.49
12	Grays Harbor	AH7000	DAMONS	Local	221436.304	193625.612	5.55
13	Grays Harbor	AH7001	ET	Local	221016.816	191040.669	8.55
14	Grays Harbor	AH7002	BUTTER	Local	220765.202	187608.277	5.50
15	Grays Harbor	SC2824	CENTRAL	Primary	256336.103	187168.504	38.31
16	Grays Harbor	AH6993	OMEN	Secondary	225495.170	185461.276	4.59
17	Grays Harbor	AH7003	NERR NERR (Destroyed)	Local	221682.225	184240.742	7.42
18	Grays Harbor	AH7004	X 1	Local	220427.159	183793.925	7.10
19	Grays Harbor	SD0042	944 1102 TIDAL 2	Local	224937.418	181306.423	4.652
20	Grays Harbor	AH7005	HD 1	Local	223445.898	180809.016	8.04
21	Grays Harbor	SD0394	GRAYS HARBOR E BASE 2	Secondary	225837.656	180705.800	5.06
22	Grays Harbor	AH7006	WORM	Local	223748.246	179169.649	9.90
23	Grays Harbor	AH7007	SPICE	Local	224091.455	177805.208	10.93
24	Grays Harbor	SD0020	GUNVILLE	Secondary	227653.074	176052.922	4.934
25	Grays Harbor	AH7008	RDAN	Local	224751.964	174824.006	6.05
26	Grays Harbor	AH7009	PRUG	Local	225147.769	171889.637	8.33
27	Pacific	AH7010	PC 068	Local	225461.984	168616.114	7.80
28	Pacific	SD0453	PC 064	Local	225502.985	165743.021	8.14
30	Pacific	AH7011	GELF	Local	225512.109	163324.692	5.74
31	Pacific	AH7012	CSW 2	Local	228200.073	161801.350	91.40
29	Pacific	AH6994	CSW 1	Secondary	228207.248	161750.215	96.91
32	Pacific	AH7013	GP 25105-13	Local	229654.821	161131.872	4.33
33	Pacific	SC0916	FLAG	Local	234674.370	158293.909	4.095

Table 1. (Continued)

Station Number	County	NGS PID	Station Designation	Station	NAD 83 (1991)		NAVD 88 Elevation
				Type	Easting (m)	Northing (m)	(m)
34	Pacific	SC2806	SOUTH BEND	Primary	246765.528	153108.439	25.193
35	Pacific	AH7014	LB 1	Local	227437.439	152509.793	3.88
36	Pacific	AH7015	PC 055 RM2	Local	227077.024	150868.728	4.58
37	Pacific	SD0533	PC 051	Local	226884.585	148626.156	8.69
38	Pacific	AH6995	BONE	Secondary	237206.298	148161.257	3.76
39	Pacific	SD0358	MESS	Local	229982.397	144909.939	4.209
40	Pacific	AH7016	PC 044	Local	227016.756	144587.456	7.26
41	Pacific	AH7017	PC 057	Local	227065.847	142639.147	7.76
42	Pacific	AH7018	GOULTER 3	Local	229766.295	141522.662	4.63
43	Pacific	SD0531	OYSTER 3	Local	227103.068	141090.565	8.29
44	Pacific	AH7019	PC 037	Local	227115.905	138871.463	9.79
45	Pacific	AH7020	PC 035	Local	227095.614	137662.732	9.76
46	Pacific	SD0323	X 537	Secondary	227176.554	137586.974	5.763
47	Pacific	AH7021	PC 032	Local	227056.809	135788.931	9.67
48	Pacific	SD0554	COTTA	Local	228989.637	135555.140	2.80
49	Pacific	SD0560	KLIPSAN 2	Local	226941.030	131888.571	8.85
50	Pacific	AH7022	PC 021	Local	226778.994	128970.830	8.69
51	Pacific	SD0538	SNAKE 2	Local	229550.786	128681.474	3.03
52	Pacific	SC1020	M 536	Secondary	238304.176	127434.240	7.789
53	Pacific	SD0563	RICH	Local	226581.743	126285.947	7.48
54	Pacific	SD0536	LIME 2	Local	229630.549	125706.828	3.32
55	Pacific	AH7023	PC 014	Local	226345.349	123150.053	7.40
56	Pacific	AH7024	PC 008	Local	225822.964	118601.072	7.42
57	Pacific	AH7025	PC 025	Local	225473.758	116431.952	6.32
58	Pacific	SD0287	TURN RM 4	Local	226897.696	116248.932	5.376
59	Wahkiakum	SC2756	GP 35004-3	Primary	257618.624	116055.406	27.89
60	Pacific	AH7026	PC 004	Local	225210.806	115181.161	7.23
61	Pacific	SD0854	NORTH HEAD RM 4	Secondary	224613.617	113727.382	77.69
62	Pacific	SD0090	MCKENZIE HEAD	n/a	Bad GPS Visibility		
77	Pacific	AH7027	MCKENZIE HEAD RM 3	Local	225330.915	111871.682	58.99
63	Pacific	SD0640	BETTY M	Local	227089.549	110920.242	6.55
64	Pacific	SD0299	944 0574 A TIDAL	Local	224638.597	110670.308	4.872
65	Clatsop	SD0651	EAST JETTY 2	Local	229432.797	105168.514	9.8
66	Clatsop	AB2106	SMUR*	Secondary	233158.444	102901.091	7.6
67	Clatsop	SC2198	MIT	Local	232150.030	100432.955	28.7
68	Clatsop	AH7028	IREDALE (Destroyed)	Local	231520.392	99783.876	8.3
78	Clatsop	AH8187	IREDALE RESET	Local	231520.396	99783.896	8.6
69	Clatsop	AH7029	KIM	Local	233109.080	96639.806	28.3
70	Clatsop	SC0554	UU 282*	Secondary	239326.392	95561.858	4.4
71	Clatsop	AH7030	RILEA	Local	233676.170	92569.623	13.0
72	Clatsop	SC1033	X 711*	Local	235757.129	88256.226	9.6
73	Clatsop	AH7031	DELRAY	Local	234763.667	85204.106	11.5
74	Clatsop	SC0617	MEADOW RESET*	Secondary	235240.572	82967.391	11.7
75	Clatsop	RD1141	SEASIDE RM 2*	Local	234404.488	79328.263	7.2
76	Clatsop	RD4216	CANN	Primary	231371.929	64617.918	30.5

*Leveled NAVD 88 orthometric height differed from GPS derived height by more than one decimeter.
Due to these errors GPS derived NAVD 88 orthometric heights for Oregon are shown to the nearest decimeter.

3.5 Additional Stations

The completion of the Washington Coastal Geodetic Control Network has allowed the Department of Ecology to conduct several GPS surveys in support of on-going research efforts in the region. Two GPS surveys and one leveling survey have been completed in which four temporary survey stations were installed and three permanent stations reobserved. The GPS surveys followed National Geodetic Survey guidelines for deriving 2-cm local vertical networks (Zilkoski *et al.* 1997). The coordinates for these stations are shown in Table 2, with station descriptions contained in Section 3 of this document.

The four temporary stations, BC TIDAL, NC TIDAL, NR TIDAL, and SB TIDAL, consist of PK-Nail and washer markers that were placed in support of an U.S. Army Corps of Engineers study being conducted in Willapa Bay, Washington. These marks were used to reference four temporary tidal gauges to the NAVD 88 datum. In addition, during this survey horizontal coordinates were obtained for the National Geodetic Survey benchmark T 530.

Survey station ASTOR (a.k.a. ASTO) was first surveyed by the NASA Wallops Flight Facility, Wallops Island, Virginia, in support of two LIDAR flights flown from the Astoria Airport in 1997 and 1998. The LIDAR flights were flown as part of the Airborne LIDAR Assessment of Coastal Erosion (ALACE) Project (Meredith *et al.* 1998). The ALACE project was being conducted as part of a cooperative agreement with the NOAA Coastal Services Center, NOAA Aircraft Operations Center (AOC), and the USGS Coastal and Marine Geology Program. As part of an effort to ground truth the LIDAR data, the Department of Ecology resurveyed the station to tie it into the local network (Daniels, submitted).

The last station listed in Table 2, X 1 RM 1, is a stainless steel rod marker. The reference station was set to prevent the loss of the vertical elevation information for station X 1, which was located within 3 m of a 4 m tall erosion scarp caused by coastal erosion during the winter of 1998. The reference station elevation was leveled using second order reset leveling techniques.

Table 2. Coordinates for six stations tied to the network but not adjusted by the NGS in the Washington State Plane South, meters, NAD 83 and NAVD 88 coordinate systems.

Station Number	County	NGS PID	Station Description	NAD 83 (1991)		NAVD 88 Elevation
				Easting (m)	Northing (m)	(m)
100	Clatsop		ASTOR (a.k.a. ASTO)	238953.073	97089.346	3.02
101	Pacific		BC TIDAL	236074.214	149158.719	4.23
102	Pacific		NC TIDAL	229622.823	135895.987	6.01
103	Pacific		NR TIDAL	238296.162	127535.464	2.96
104	Pacific		SB TIDAL	246578.968	153728.636	4.33
105	Pacific	SC0980	T 540	240118.114	138893.909	31.47
106	Grays Harbor		X 1 RM 1	220440.6	183959.5	5.68

3.6 Project Summary

During this GPS survey the Department of Ecology, with the assistance of the USGS and NGS, successfully established a GPS-derived 2 cm-level local vertical control network based on NGS guidelines for establishing GPS-derived ellipsoid heights (Zilkoski *et al.* 1997). The Washington Coastal Geodetic Control Network has been reviewed by the NGS and was adjusted in December 1998. This network is currently part of the National Spatial Reference System. The National Spatial Reference System database contains descriptions for benchmarks and survey stations for the entire United States and may be accessed via the NGS web page at http://www.ngs.noaa.gov.

4.0 Oregon Elevation Offset

This geodetic control project identified a vertical offset between the leveling network in northwest Oregon and southwest Washington. Leveled NAVD 88 orthometric heights at four of the five first order vertical benchmarks occupied in Oregon differed from GPS derived orthometric heights by more than one decimeter. It appears that the orthometric heights used in the original NAVD 88 adjustment were not accurate enough to control the leveling network. The NGS is currently investigating the problem and a regional readjustment will be completed by the NGS in the future (Carlson 1998; Section 4 of this report).

This height discrepancy was identified by the NGS during their final adjustment of the GPS data. Leveling work conducted by the NGS in 1996 identified similar misclosures in the leveling network in the northwestern part of Clatsop County. The first leveling line in the area was installed in 1943. The second was installed independently in 1987. When these two lines were connected by leveling in 1996 during the installation of the U.S. Coast Guard DGPS/CORS system at Fort Stevens, Oregon, differences as large as 0.20 m were identified between the two leveling lines (Fredrick *et al.* 1996).

Due to this elevation offset, the new stations installed in Oregon for this survey have published NAVD 88 elevations shown to the nearest decimeter (0.1 m). In comparison, heights were published to the nearest centimeter for Washington. This discrepancy is problematic, as the Southwest Washington Coastal Erosion Study requires centimeter level elevations for the stations. Fortunately, if we assume that the leveled NAVD 88 orthometric heights at the four problematic stations are incorrect, the methods developed by Milbert and Smith (1996a) may be used to estimate the "true" NAVD 88 orthometric height of the stations in Oregon. Milbert and Smith (1996a) have determined that the NAVD 88 orthometric height of a station may be estimated with the following equation:

$$H_{88} = h_{83} - N_{96} , \qquad (1a)$$

where H_{88} is the estimated NAVD 88 orthometric height, h_{83} is the NAD 83 GPS ellipsoid height, and N_{96} is the a geoid height calculated from a model of the Earth's gravity (GEOID96). When utilizing this equation, one should not expect the estimated NAVD 88 height to exactly match a leveled NAVD 88 orthometric height for a station. The difference between the leveled and estimated orthometric height for a station is partially a result of error in the GEOID96 model

and datum definition. By subtracting the estimated height, H_{88}, from the published orthometric height for an existing station one may obtain a "local orthometric height correction factor" that can be applied to other nearby stations (Milbert and Smith 1996b). If many benchmarks are occupied over an extensive area (> 100 km's), trends in this correction factor may be detected.

The orthometric height correction factor used here for Oregon is based on seven benchmarks in Washington. The Washington stations selected were directly across the Columbia River from the effected area. These stations included four first order vertical benchmarks and three stations with GPS derived orthometric heights. The published NAVD 88 elevation of each station was compared with that obtained using equation (1a) and the difference obtained. These differences were then averaged to obtain a local orthometric height correction factor for Oregon of 0.14 m. This correction factor was then applied to each of the thirteen Oregon stations using a modified version of Equation 1a:

$$H_{88} = h_{83} - N_{96} + L, \quad (1b)$$

where L is the local orthometric height correction factor. Equation 1b was applied to the Oregon stations and estimated centimeter level NAVD 88 orthometric heights obtained. The estimated NAVD 88 orthometric heights are shown with **bold text** in Table 3 and are estimated to be correct within ±2 cm.

Table 3. Estimated centimeter level elevations for the twelve Oregon stations. Estimated elevations based on the regional GEOID96 correction factor are shown in bold text (values in meters).

Station Designation	State	GEOID 96	NAD 83 Ellipsoid	NAVD 88 Published Elevation	NAVD 88 Predicted (Eq. 1a)	Predicted w/correction (Eq. 1b)	Predicted w/correction Less Published	Vertical Order
X 537	WA	-24.150	-18.54	5.763	5.61	5.75	-0.01	1
SNAKE 2	WA	-23.970	-21.09	3.03	2.88	3.02	-0.01	GPS
M 536	WA	-23.290	-15.61	7.788	7.68	7.82	0.03	1
TURN RM 4	WA	-24.113	-18.91	5.358	5.20	5.34	-0.01	1
PC 004	WA	-24.220	-17.12	7.25	7.10	7.24	-0.01	GPS
MCKENZIE HEAD RM 3	WA	-24.200	34.66	58.99	58.86	59.00	0.01	GPS
944 0574 A TIDAL	WA	-24.237	-19.50	4.872	4.74	4.88	0.01	1
EAST JETTY 2	OR	-23.930	-14.26	9.8	9.67	9.81	0.01	GPS
SMUR	OR	-23.651	-16.20	7.669	7.45	7.59	-0.08	1
MIT	OR	-23.686	4.92	28.7	28.61	28.75	0.05	GPS
IREDALE	OR	-23.720	-15.52	8.3	8.20	8.34	0.04	GPS
IREDALE RESET	OR	-23.720	-15.27	8.6	8.45	8.59	-0.01	GPS
KIM	OR	-23.550	4.63	28.3	28.18	28.32	0.02	GPS
UU 282	OR	-23.110	-18.80	4.579	4.31	4.45	-0.13	1
RILEA	OR	-23.440	-10.54	13	12.90	13.04	0.04	GPS
X 711	OR	-23.200	-13.71	9.742	9.49	9.63	-0.11	1
DELRAY	OR	-23.190	-11.79	11.5	11.40	11.54	0.04	GPS
MEADOW RESET	OR	-23.090	-11.51	11.834	11.58	11.72	-0.11	1
SEASIDE RM 2	OR	-23.030	-15.99	7.297	7.04	7.18	-0.12	1
CANN	OR	-22.910	7.46	30.5	30.37	30.51	0.01	GPS

The GEOID96 to NAVD 88 regional correction factor based on Washington stations is 0.14 meters.
Bold values are predicted NAVD 88 orthometric heights for the twelve stations in Clatsop County, Oregon.
Note that the GPS-derived NAVD 88 elevations have been published by the NGS for Oregon to 0.1 m.

5.0 Tidal Datums

The sponsors of this geodetic network are conducting coastal research and are interested in the relationship between the terrestrial NAVD 88 datum and water level datums, such as, Mean Lower Low Water (MLLW), Mean Low Water (MLW), Mean High Water (MHW), and Mean Higher High Water (MHHW). It is important to note that the terms MLLW, MLW, MHW, and MHHW are used in relation to a tidal datum that has been calculated for a given location based on several months to years of tide gauge data. The relationship between a terrestrial based datum such as NAVD 88 and a tidal datum is not uniform throughout a region as large as the Columbia River littoral cell. As such, a tidal datum has minimal value outside of the area for which it was calculated. In contrast, the NAVD 88 datum is valid throughout North America (Note, the term mean sea level is not discussed here as it is an alternate name for the old NGVD 1929 vertical datum and is not a true tidal datum).

In an effort to determine the relationship between NAVD 88 and the tidal datums within the region, ten National Ocean Service (NOS) tidal benchmarks were identified with known or GPS

surveyed NAVD 88 elevations (Table 4). The MLLW, MLW, MHW, and MHHW elevation for each benchmark was calculated based on NOS tidal benchmark data sheets. The NAVD 88 elevations of the tidal stations were observed in the field with RTK-GPS using the WCGC network for control. Vertical elevation discrepancies between GPS-derived and published elevations of 10 cm were found at the three tidal benchmarks in Oregon; a 5-cm error was noted at one of the two benchmarks at Point Grenville, WA. The 0.1 m discrepancy in Oregon may be related to the Oregon offset problem previously discussed. When discrepancies occurred between published and observed NAVD 88 elevations, the GPS elevations were used in the analysis.

Table 4. NAVD 88 elevations for tidal benchmarks located throughout the Columbia River littoral cell (values in meters).

Station Designation	NGS PID	Northing (m)	Geographic Location	NAVD88 Elevation	NAVD88 MLLW	NAVD88 MLW	NAVD88 MHW	NAVD88 MHHW
942 8478 TIDAL 1 B 1971 GPS	SC1040	80015.82	Seaside, OR	5.76	0.74	0.86	2.29	2.51
FORT STEVENS LONGITUDE STATION GPS	SC0584	100053.64	Ft. Stevens, OR	5.59	-0.16	0.22	2.20	2.41
943 9008 TIDAL 3 1940 GPS	SD0586	100053.64	Ft. Stevens, OR	3.14	-0.15	0.23	2.21	2.42
BETTY M 1976	SD0640	110920.23	Jetty A, Columbia River	6.55	-0.19	0.23	2.06	2.27
944 0574 A 1982	SD0299	110670.30	North Jetty, Columbia River	4.87	-0.05	0.31	2.06	2.26
FLAG 1958	SC0916	158293.89	Tokeland, WA	4.10	-0.24	0.17	2.23	2.46
944 1102 TIDAL 2 RESET 1952	SD0042	181306.38	Westport, WA	4.65	-0.46	-0.04	2.11	2.33
944 1156 B 1982 GPS	No PID	185847.69	Ocean Shores, WA	4.68	-0.54	-0.10	2.10	2.32
944 1627 TIDAL 7 1972 GPS	SD0135	225404.00	Point Grenville, WA	2.89	-0.36	-0.02	1.90	2.12
944 1627 TIDAL 4 1944 GPS	No PID	225404.00	Point Grenville, WA	2.29	-0.31	0.03	1.95	2.17
				Average	-0.17	0.19	2.11	2.33
				Std. Dev.	0.35	0.27	0.12	0.12

NAVD 88 elevations for stations with 'GPS' appended to their name may differ from published values. Published NAVD88 elevations are only available for stations with NGS PID numbers.

In an effort to extrapolate the available tidal data to the entire coast, linear regression analyses were performed on the data shown in Table 4. These analyses assume that the northing coordinate (i.e., latitude) of a station is a controlling factor in determining its tidal elevation and that a linear equation may be developed to predict the MLLW, MLW, MHW, and MHHW for open coast locations within the study area.

The linear regression analysis obtained a r^2 value of 0.46 between northing coordinates and NAVD 88 MLLW elevations (i.e., 46% of the variation within the data was explained by the linear regression equation). Similar linear regression equations obtained r^2 values for the MLW (0.58), MHW (0.54), and MHHW (0.48) datums.

The linear regression results were used to derive Equations 2, 3, 4, and 5. These equations may be used to estimate a MLLW, MLW, MHW, or MHHW elevation for coastal location within the Columbia River littoral cell. The equation derived for MLW and MHW have the highest r^2 and should be used when possible. Note that these equations use Northing values in meters, expressed in the NAD 83 Washington State Plane South coordinate system.

$$\text{MHHW} = \text{Northing} \times -2.556 \times 10^{-6} + 2.5561, \quad (2)$$

$$\text{MHW} = \text{Northing} \times -1.670 \times 10^{-6} + 2.3593, \quad (3)$$

$$\text{MLW} = \text{Northing} \times -3.819 \times 10^{-6} + 0.7546, \quad (4)$$

$$\text{MLLW} = \text{Northing} \times -4.423 \times 10^{-6} + 0.4822. \quad (5)$$

Equations 2, 3, 4, and 5 are based on historical tide data for eight stations within the region. A more detailed analysis of the relationship between NAVD 88 and MLLW, MLW, MHW, and MHHW would require the placement and simultaneous monitoring of several tide gauges on the open ocean coast over several months. As such, these equations can only approximate the true tidal elevation for a site. Based on the 95% confidence intervals calculated for each equation the estimated error range of each equation is about ±0.15 m.

To provide a graphical example of the error associated with these equations, Figure 6 has been developed. Figure 6 shows the actual and estimated values for MLW and MHW for the eight tidal stations within the Columbia River littoral cell along with the 95% standard error bar for each estimate.

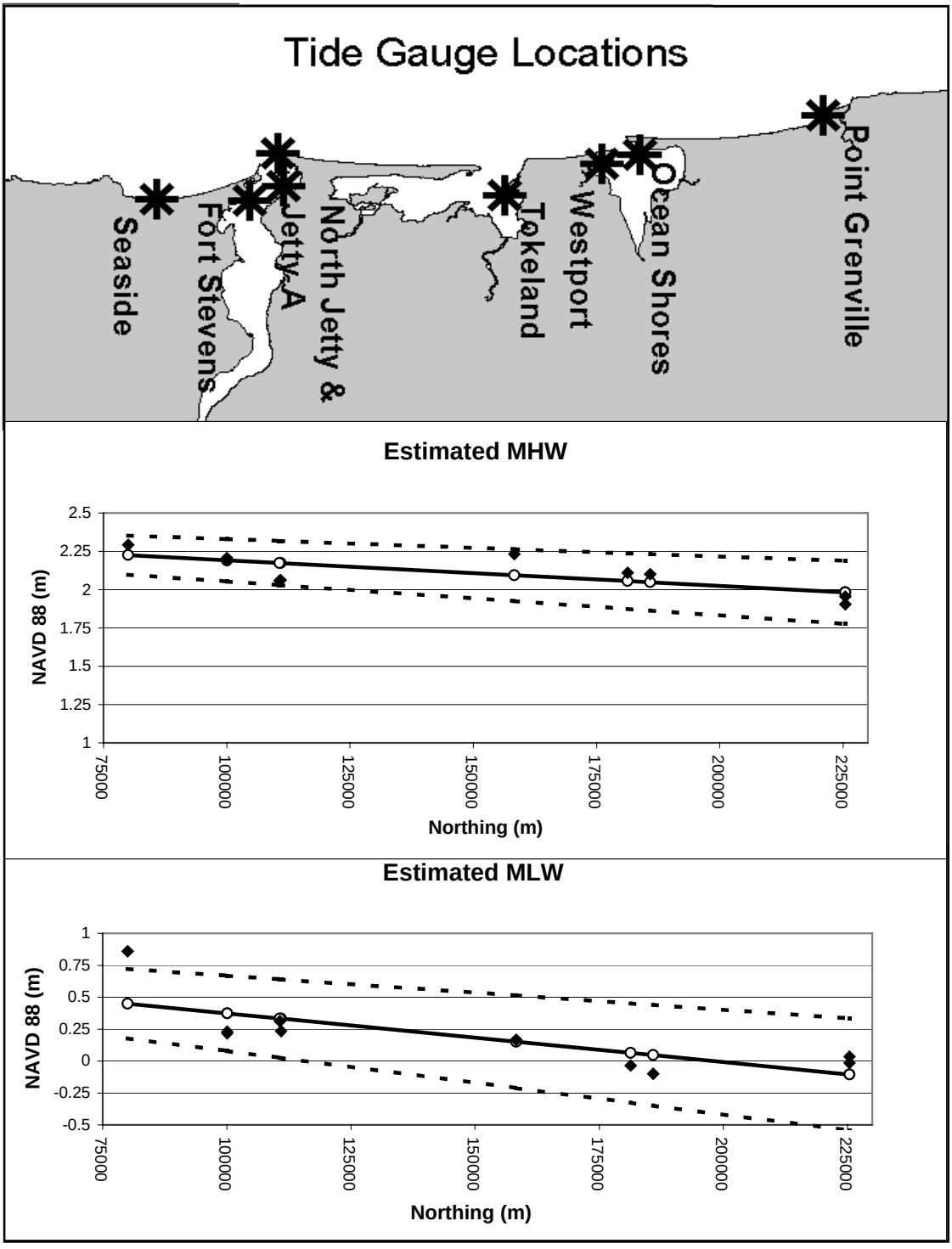

Figure 6. **Estimated (○) and actual (♦) MHW and MLW elevations for the tidal stations within the Columbia River littoral cell. Dashed lines show the 95% confidence interval of the equations used to calculate the estimated MHW and MLW values.**

6.0 Station Descriptions

Section 2 of this document contains the NGS data sheets for all seventy-six stations successfully occupied during this survey. Section 3 contains descriptions of several additional stations that have been subsequently tied to the Washington Coastal Geodetic Control Network. These additional stations have not been adjusted by the NGS.

7.0 Acknowledgements

The completion of the Washington Coastal Geodetic Control Project has been made possible by the contributions of many individuals and agencies. Fred Budweg and Steve Tew (Ecology) compiled the initial survey station inventories for the region. Gene Zerby and Bill Shootie of Grays Harbor County and Fred Childress of Pacific County provided station information to Ecology. The project scope was conceived by George Kaminsky (Ecology) with the support of Gary Perasso (NGS) and Kurt Iverson (WS DOT). Initial network design was completed by Ecology with the assistance of Kurt Iverson (WS DOT), Gary Perasso (NGS), Steve Frakes (NGS). New geodetic survey stations were installed by a combined crew of Ecology and NGS personnel (J. Gary Fredricks, NGS Survey Section E, Seattle). Weber GPS consultants conducted initial data processing and preliminary adjustment of the data. Final adjustment of the data was completed and reviewed by David Zilkoski and Edward Carlson of the NGS. Funding for the Washington Coastal Geodetic Control Network was provided by Ecology and the USGS as part of the Southwest Washington Coastal Erosion Study.

8.0 References

Carlson, E. 1998. *Report of Horizontal Control & Vertical Computations*. National Geodetic Survey, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Silver Springs, MD.

Daniels, R.C. submitted. GPS, LIDAR, and the local orthometric height correction factor. *Photogrammetric Engineering & Remote Sensing.*

Daniels, R.C. and P. Ruggiero. 1997. *Project Report (Field Activities) for the Washington Coastal Geodetic Control Project, Conducted as part of the Southwest Washington Coastal Erosion Study*. Coastal Monitoring and Analysis Program, Department of Ecology, Olympia, WA.

Fredrick, J.G., J.R. Minton, and T.A. Haupt. 1996. *U.S. Coast Guard DGPS/CORS System: Survey Field Report of Leveling*. Fort Stevens USCG CORS Site Survey L25624-SF, Field Observation Branch, National Geodetic Survey, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Silver Spring, MD.

Kaminsky, G. M., P. Ruggiero, G. Gelfenbaum, and C. Peterson. 1997. Long term coastal evolution and regional dynamics of a US Pacific Northwest littoral cell. *Coastal Dynamics'97*, Plymouth, UK, American Society of Civil Engineers, Reston, VA, pp. 614-623.

Kaminsky, G. M., P. Ruggiero, and G. Gelfenbaum. 1998. Monitoring coastal change in southwest Washington and northwest Oregon during the 1997/98 El Niño. *Shore & Beach*, 66:42-51.

Meredith, A., W. Krabill, J. List, T. Reiss, E. Fredrick, C. Martin, J. Brock, R. Swift, R. Holman, K. Morgan, S. Manizade, J. Sonntag, A. Sallenger Jr., M. Hearne, M. Hansen, C. Wright, and J. Yungel, 1998. *An Assessment of NASA's Airborne Topographic Mapper Instrument for Beach Topographic Mapping at Duck, North Carolina*. Coastal Services Center Technical Report CSC/9-98/001, U.S. Department of Commerce, NOAA, Coastal Services Center, Charleston, SC.

Milbert, D.G. 1998. *Documentation for the GPS Benchmark Data Set of 23-July-98*. Online GPS Benchmark documentation file, Information Services Branch, National Geodetic Survey, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Silver Spring, MD.

Milbert, D. G. and D. A. Smith. 1996a. Converting GPS height into NAVD 88 elevation with the GEOID96 geoid height model. *Proceedings of GIS/LIS '96 Annual Conference and Exposition*, Denver, Colorado, American Congress on Surveying and Mapping, Washington, DC, pp. 681-692.

Milbert, D. G. and D. A. Smith. 1996b. *The GEOID96 Geoid Models*. Online GEOID96 documentation file, Information Services Branch, National Geodetic Survey, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Silver Spring, MD.

Ruggiero, P., G. Kaminsky, and N.G. Plant. 1998. Coastal morphologic variability of high energy dissipative beaches. *26th International Conference on Coastal Engineering*, Copenhagen, DK, pp. 3238-3251.

Ruggiero, P., J. Côté, G. Kaminsky, and G. Gelfenbaum. 1999. Scales of variability along the Columbia River littoral cell. *Coastal Sediments'99, Volume 2*. American Society of Civil Engineers, Long Island, NY, pp. 1692-1707.

Smith, D. and R. Roman. 1999. *Readme file for GEOID99*. Online file at http://www.ngs.noaa.gov/GEOID/GEOID99/geoid99.html, Information Services Branch, National Geodetic Survey, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Silver Spring, MD.

Zilkoski, D. B., J. D. D'Onofrio, and S. J. Frakes. 1997. *Guidelines for Establishing GPS-Derived Ellipsoid Heights (Standards: 2 cm and 5 cm), Version 4.3*. NOAA Technical Memorandum NOS NGS-58, National Geodetic Information Center, National Geodetic Survey, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Silver Spring, MD.

SECTION 2: NGS DATA SHEETS

```
1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0299 ***********************************************************************
 SD0299  TIDAL BM    -  This is a Tidal Bench Mark.
 SD0299  DESIGNATION -  944 0574 A TIDAL
 SD0299  PID         -  SD0299
 SD0299  STATE/COUNTY-  WA/PACIFIC
 SD0299  USGS QUAD   -  CAPE DISAPPOINTMENT (1985)
 SD0299
 SD0299                         *CURRENT SURVEY CONTROL
 SD0299  ______________________________________________________________________
 SD0299* NAD 83(1991)-  46 16 22.39978(N)    124 04 25.72046(W)     ADJUSTED
 SD0299* NAVD 88     -         4.872  (meters)      15.98   (feet)  ADJUSTED
 SD0299  ______________________________________________________________________
 SD0299  X           -  -2,474,354.980 (meters)                     COMP
 SD0299  Y           -  -3,658,207.684 (meters)                     COMP
 SD0299  Z           -   4,586,252.261 (meters)                     COMP
 SD0299  LAPLACE CORR-          14.40  (seconds)                    DEFLEC96
 SD0299  ELLIP HEIGHT-         -19.50  (meters)                     GPS OBS
 SD0299  GEOID HEIGHT-         -24.24  (meters)                     GEOID96
 SD0299  DYNAMIC HT  -           4.872 (meters)      15.98  (feet)  COMP
 SD0299  MODELED GRAV-     980,706.4   (mgal)                       NAVD 88
 SD0299
 SD0299  HORZ ORDER  -  FIRST
 SD0299  VERT ORDER  -  FIRST     CLASS II
 SD0299  ELLP ORDER  -  THIRD     CLASS II
 SD0299
 SD0299.The horizontal coordinates were established by GPS observations
 SD0299.and adjusted by the National Geodetic Survey in January 1999.
 SD0299
 SD0299.The orthometric height was determined by differential leveling
 SD0299.and adjusted by the National Geodetic Survey in June 1991.
 SD0299
 SD0299.This mark is designated as VM 8938 in the Oceanographic Products
 SD0299.and Services Division Tidal Bench Mark database.
 SD0299
 SD0299.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0299
 SD0299.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0299
 SD0299.The ellipsoidal height was determined by GPS observations
 SD0299.and is referenced to NAD 83.
 SD0299
 SD0299.The geoid height was determined by GEOID96.
 SD0299
 SD0299.The dynamic height is computed by dividing the NAVD 88
 SD0299.geopotential number by the normal gravity value computed on the
 SD0299.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 SD0299.degrees latitude (G = 980.6199 gals.).
 SD0299
 SD0299.The modeled gravity was interpolated from observed gravity values.
 SD0299
 SD0299;                    North         East     Units   Scale      Converg.
 SD0299;SPC WA S     -   110,670.308   224,638.597   MT  0.99992937 -2 35 45.6
 SD0299;UTM  10      - 5,124,928.346   417,262.225   MT  0.99968415 -0 46 33.7
 SD0299
 SD0299                           SUPERSEDED SURVEY CONTROL
 SD0299
```

```
SD0299.No superseded survey control is available for this station.
SD0299
SD0299_MARKER: DJ = TIDAL STATION DISK
SD0299_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
SD0299_STAMPING: 0574 A 1982
SD0299_PROJECTION: RECESSED 10 CENTIMETERS
SD0299_MAGNETIC: I = MARKER IS A STEEL ROD
SD0299_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
SD0299_ROD/PIPE-DEPTH: 10   meters
SD0299
SD0299  HISTORY     - Date     Condition        Recov. By
SD0299  HISTORY     - 1982     MONUMENTED       NOS
SD0299  HISTORY     - 1987     GOOD             NGS
SD0299  HISTORY     - 1989     GOOD             USPSQD
SD0299  HISTORY     - 19971204 GOOD             WADECO
SD0299
SD0299                          STATION DESCRIPTION
SD0299
SD0299'DESCRIBED BY NATIONAL GEODETIC SURVEY 1987
SD0299'5.7 KM (3.55 MI) SOUTH FROM ILWACO.
SD0299'0.16 KM (0.10 MI) WEST ALONG SPRUCE STREET FROM THE JUNCTION OF FIRST
SD0299'STREET SOUTH AND US HIGHWAY 101 NORTH IN ILWACO, THENCE 3.6 KM (2.25
SD0299'MI) SOUTH ALONG 2ND AVENUE TO THE ENTRANCE GATE TO CANBY PARK, THENCE
SD0299'1.93 KM (1.20 MI) SOUTHWEST ALONG JETTY ROAD, 50.0 M (164.0 FT)
SD0299'NORTHEAST OF THE NORTHEAST SHOULDER OF A ROAD LEADING SOUTHEAST OF A
SD0299'PARKING LOT, 7.0 M (23.0 FT) SOUTHEAST OF THE SOUTHEAST EDGE OF JETTY
SD0299'ROAD.
SD0299'THE MARK IS 0.91 METERS  N FROM  A WITNESS POST
SD0299'THE MARK IS 0.3 M ABOVE THE ROAD.
SD0299
SD0299                          STATION RECOVERY (1989)
SD0299
SD0299'RECOVERY NOTE BY US POWER SQUADRON 1989 (FPC)
SD0299'RECOVERED IN GOOD CONDITION.
SD0299
SD0299                          STATION RECOVERY (1997)
SD0299
SD0299'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0299'RECOVERED AS DESCRIBED.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0042 ***********************************************************************
 SD0042  TIDAL BM    -  This is a Tidal Bench Mark.
 SD0042  DESIGNATION -  944 1102 TIDAL 2 1952
 SD0042  PID         -  SD0042
 SD0042  STATE/COUNTY-  WA/GRAYS HARBOR
 SD0042  USGS QUAD   -  WESTPORT (1984)
 SD0042
 SD0042                         *CURRENT SURVEY CONTROL
 SD0042  ______________________________________________________________________
 SD0042* NAD 83(1991)-  46 54 28.19631(N)    124 06 42.80085(W)     ADJUSTED
 SD0042* NAVD 88     -         4.652  (meters)      15.26   (feet)  ADJUSTED
 SD0042  ______________________________________________________________________
 SD0042  X           -  -2,448,030.104 (meters)                     COMP
 SD0042  Y           -  -3,614,109.715 (meters)                     COMP
 SD0042  Z           -   4,634,756.274 (meters)                     COMP
 SD0042  LAPLACE CORR-          12.54  (seconds)                    DEFLEC96
 SD0042  ELLIP HEIGHT-         -19.92  (meters)                     GPS OBS
 SD0042  GEOID HEIGHT-         -24.39  (meters)                     GEOID96
 SD0042  DYNAMIC HT  -           4.652 (meters)      15.26  (feet)  COMP
 SD0042  MODELED GRAV-     980,736.6   (mgal)                       NAVD 88
 SD0042
 SD0042  HORZ ORDER  -  FIRST
 SD0042  VERT ORDER  -  FIRST     CLASS II
 SD0042  ELLP ORDER  -  THIRD     CLASS II
 SD0042
 SD0042.The horizontal coordinates were established by GPS observations
 SD0042.and adjusted by the National Geodetic Survey in January 1999.
 SD0042
 SD0042.The orthometric height was determined by differential leveling
 SD0042.and adjusted by the National Geodetic Survey in June 1991.
 SD0042
 SD0042.This mark is designated as VM 8980 in the Oceanographic Products
 SD0042.and Services Division Tidal Bench Mark database.
 SD0042
 SD0042.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0042
 SD0042.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0042
 SD0042.The ellipsoidal height was determined by GPS observations
 SD0042.and is referenced to NAD 83.
 SD0042
 SD0042.The geoid height was determined by GEOID96.
 SD0042
 SD0042.The dynamic height is computed by dividing the NAVD 88
 SD0042.geopotential number by the normal gravity value computed on the
 SD0042.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 SD0042.degrees latitude (G = 980.6199 gals.).
 SD0042
 SD0042.The modeled gravity was interpolated from observed gravity values.
 SD0042
 SD0042;                    North         East     Units   Scale      Converg.
 SD0042;SPC WA S     -   181,306.423   224,937.418   MT  0.99993044 -2 37 25.2
 SD0042;UTM  10      - 5,195,521.965   415,323.080   MT  0.99968813 -0 48 43.2
 SD0042
 SD0042                           SUPERSEDED SURVEY CONTROL
 SD0042
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SD0042  NGVD 29     -         3.655  (m)           11.99   (f) ADJ UNCH    1 2
SD0042
SD0042.Superseded values are not recommended for survey control.
SD0042.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0042.See file dsdata.txt to determine how the superseded data were derived.
SD0042
SD0042_MARKER: DB = BENCH MARK DISK
SD0042_SETTING: 30 = FLAG POLE BASE (POLE REMOVED)
SD0042_STAMPING: TIDAL 2 RESET 1952
SD0042_PROJECTION: FLUSH
SD0042_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0042_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0042+STABILITY: SURFACE MOTION
SD0042
SD0042  HISTORY     - Date     Condition        Recov. By
SD0042  HISTORY     - 1952     MONUMENTED       CGS
SD0042  HISTORY     - 1968     GOOD             NGS
SD0042  HISTORY     - 1976     GOOD             LOCENG
SD0042  HISTORY     - 19971015 GOOD             WADECO
SD0042
SD0042                          STATION DESCRIPTION
SD0042
SD0042'DESCRIBED BY NATIONAL GEODETIC SURVEY 1968
SD0042'1.25 MI N FROM WESTPORT.
SD0042'0.9 MILE NORTH ALONG MONTESANO AVENUE FROM THE POST OFFICE AT
SD0042'WESTPORT, THENCE 0.15 MILE NORTHEAST ALONG PATTERSON STREET, THENCE
SD0042'0.2 MILE NORTHWEST ALONG WESTHAVEN DRIVE, AT WESTHAVEN GRAYS HARBOR
SD0042'COAST GURAD STATION, IN THE TOP OF THE CONCRETE BASE OF THE FLAGPOLE,
SD0042'0.6 FOOT SOUTH OF THE POLE, 150 FEET SOUTHWEST OF THE CENTER LINE OF
SD0042'THE DRIVE, 54 FEET NORTH OF THE CENTER OF THE NORTHEAST ENTRANCE TO
SD0042'THE COAST GUARD BUILDING, AND ABOUT LEVEL WITH THE GROUND.
SD0042
SD0042                          STATION RECOVERY (1976)
SD0042
SD0042'RECOVERY NOTE BY LOCAL ENGINEER (INDIVIDUAL OR FIRM) 1976
SD0042'RECOVERED IN GOOD CONDITION.
SD0042
SD0042                          STATION RECOVERY (1997)
SD0042
SD0042'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0042'RECOVERED AS DESCRIBED.  A NEW USCG STATION HAS BEEN BUILT 0.1 MILES
SD0042'(0.2 KM) EAST ON WESTHAVEN DRIVE.  THE MARK IS NOW LOCATED AT THE
SD0042'WESTPORT MERITIME MUSEUM.  THE CURRENT FLAG POLE AT THE MUSEUM
SD0042'REPLACES THE ORIGINAL ONE THAT WAS REMOVED.  HOWEVER, THE CEMENT PAD
SD0042'WITH THE TIDAL DISK IS STILL IN PLACE.  THE STATION IS 54 FT (16.5 M)
SD0042'SOUTH OF THE CENTER OF THE NORTHEAST (MAIN) ENTRANCE TO THE MUSEUM AND
SD0042'ON-LINE WITH THE WEST MOST SIDE OF THE BUILDING.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0640 ***********************************************************************
 SD0640  TIDAL BM    -  This is a Tidal Bench Mark.
 SD0640  DESIGNATION -  BETTY M
 SD0640  PID         -  SD0640
 SD0640  STATE/COUNTY-  WA/PACIFIC
 SD0640  USGS QUAD   -  CAPE DISAPPOINTMENT (1985)
 SD0640
 SD0640                        *CURRENT SURVEY CONTROL
 SD0640  ______________________________________________________________________
 SD0640* NAD 83(1991)-  46 16 34.06634(N)    124 02 31.88320(W)     ADJUSTED
 SD0640* NAVD 88     -         6.55   (meters)      21.5    (feet)  GPS OBS
 SD0640  ______________________________________________________________________
 SD0640  X           -  -2,472,190.627 (meters)                     COMP
 SD0640  Y           -  -3,659,358.066 (meters)                     COMP
 SD0640  Z           -   4,586,502.580 (meters)                     COMP
 SD0640  LAPLACE CORR-          13.63  (seconds)                    DEFLEC96
 SD0640  ELLIP HEIGHT-         -17.66  (meters)                     GPS OBS
 SD0640  GEOID HEIGHT-         -24.08  (meters)                     GEOID96
 SD0640
 SD0640  HORZ ORDER  -  FIRST
 SD0640  ELLP ORDER  -  THIRD     CLASS II
 SD0640
 SD0640.The horizontal coordinates were established by GPS observations
 SD0640.and adjusted by the National Geodetic Survey in January 1999.
 SD0640
 SD0640.The orthometric height was determined by GPS observations and a
 SD0640.high-resolution geoid model using precise GPS observation and
 SD0640.processing techniques.
 SD0640
 SD0640.This mark is designated as VM 8923 in the Oceanographic Products
 SD0640.and Services Division Tidal Bench Mark database.
 SD0640
 SD0640.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0640
 SD0640.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0640
 SD0640.The ellipsoidal height was determined by GPS observations
 SD0640.and is referenced to NAD 83.
 SD0640
 SD0640.The geoid height was determined by GEOID96.
 SD0640
 SD0640;                    North         East     Units   Scale      Converg.
 SD0640;SPC WA S     -   110,920.242   227,089.549   MT  0.99992906 -2 34 22.9
 SD0640;SPC OR N     -   295,973.528 2,227,043.513   MT  1.00008199 -2 30 43.5
 SD0640;UTM  10      - 5,125,255.911   419,703.399   MT  0.99967926 -0 45 11.6
 SD0640
 SD0640:                Primary Azimuth Mark                    Grid Az
 SD0640:SPC WA S     -  BLUFF 3                                 016 02 37.0
 SD0640:SPC OR N     -  BLUFF 3                                 015 58 57.6
 SD0640:UTM  10      -  BLUFF 3                                 014 13 25.7
 SD0640
 SD0640|----------------------------------------------------------------------|
 SD0640| PID    Reference Object                    Distance      Geod. Az  |
 SD0640|                                                          dddmmss.s |
 SD0640| SD0874 BLUFF 3                          APPROX. 3.6 KM 0132814.1 |
 SD0640| SD0872 BAKER BAY W CHAN DAYBEACON 11    455.273 METERS 0153630.1 |
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SD0640| AE4640 BETTY M RM 2                            8.909 METERS 04740     |
SD0640| SD0613 TRESTLE                                APPROX. 3.5 KM 2494310.0 |
SD0640| SD0595 CAPE DISAPPOINTMENT LH                 APPROX. 0.8 KM 2672921.2 |
SD0640| AE4639 BETTY M RM 1                            25.152 METERS 28816     |
SD0640|-----------------------------------------------------------------------|
SD0640
SD0640                          SUPERSEDED SURVEY CONTROL
SD0640
SD0640  NAD 83(1991)-  46 16 34.06883(N)    124 02 31.88083(W) AD(       ) 2
SD0640  NAD 83(1991)-  46 16 34.06878(N)    124 02 31.88086(W) AD(       ) 2
SD0640  NAD 83(1986)-  46 16 34.07202(N)    124 02 31.85574(W) AD(       ) 2
SD0640  NAD 27      -  46 16 34.71214(N)    124 02 27.30520(W) AD(       ) 2
SD0640  NGVD 29     -         5.4    (m)           18.     (f) VERT ANG
SD0640
SD0640.Superseded values are not recommended for survey control.
SD0640.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0640.See file dsdata.txt to determine how the superseded data were derived.
SD0640
SD0640_MARKER: DD = SURVEY DISK
SD0640_SETTING: 4 = TOP OF SQUARE CONCRETE MONUMENT
SD0640_STAMPING: BETTY M 1976
SD0640_PROJECTION: FLUSH
SD0640_MAGNETIC: A = STEEL ROD ADJACENT TO MONUMENT
SD0640_STABILITY: D = MARK OF QUESTIONABLE OR UNKNOWN STABILITY
SD0640_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SD0640+SATELLITE: SATELLITE OBSERVATIONS - October 12, 1989
SD0640
SD0640  HISTORY     - Date     Condition        Recov. By
SD0640  HISTORY     - 1976     MONUMENTED       WA-049
SD0640  HISTORY     - 1976     GOOD             WA-049
SD0640  HISTORY     - 19830113 GOOD             NGS
SD0640  HISTORY     - 19891012 GOOD             MGSINC
SD0640  HISTORY     - 19971204 GOOD             WADECO
SD0640
SD0640                          STATION DESCRIPTION
SD0640
SD0640'DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (CLN)
SD0640'THIS STATION WAS ESTABLISHED TO REPLACE TRESTLE 1942 WHICH MIGHT BE
SD0640'DISTURBED BY WAVE ACTION DURING THE SEASONAL STORMS.
SD0640'
SD0640'STATION IS ABOUT 2 MILES DUE SOUTH OF ILWACO, ON THE SOUTHWEST SIDE
SD0640'OF BAKER BAY ON A ROCK FILL AT THE NORTHEASTERLY (INLAND) END OF
SD0640'A-JETTY AND ABOUT 200 FEET NORTHEAST OF THE END OF THE ROAD.
SD0640'
SD0640'TO REACH FROM THE INTERSECTION OF 1ST AND SPRUCE ST. IN ILWACO, GO
SD0640'WEST ON ILWACO-NORTH HEAD ROAD 0.07 MILE, TAKE RIGHT FORK, GO 0.76
SD0640'MILE KEEP LEFT, GO 1.02 MILES KEEP LEFT, GO 0.36 MILE KEEP LEFT AT
SD0640'NORTH HEAD LIGHTHOUSE ROAD, GO 0.70 MILE KEEP RIGHT AT Y
SD0640'INTERSECTION, GO 0.47 MILE CONTINUE STRAIGHT, GO 0.12 MILE KEEP
SD0640'LEFT, GO 0.14 MILE TO INTERSECTION CONTINUE STRAIGHT, GO 0.20
SD0640'MILE TO GATE AT U.S. COAST GUARD STATION, CONTINUE ALONG
SD0640'SHORELINE 0.22 MILE TO A LOCKED U.S. CORP. OF ARMY ENGINEERS GATE
SD0640'AT BOAT HOUSE PARKING LOT.  (KEY CAN BE OBTAINED FROM COAST
SD0640'GUARD STATION) CONTINUE THRU GATE 0.03 MILE, TAKE LEFT FORK
SD0640'GO 0.22 MILE KEEP RIGHT, GO 0.02 MILE KEEP LEFT, GO 0.12 MILE
SD0640'TO STATION ON LEFT.
SD0640'
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SD0640'TWO WHEEL DRIVE VEHICLE CAN BE DRIVEN TO STATION.
SD0640'
SD0640'THE STATION MARK HAS A SURFACE DISK ONLY, STAMPED BETTY M 1976.
SD0640'MARK IS A STANDARD PACIFIC COUNTY DISK SET IN CONCRETE TWO FEET IN
SD0640'DIAMETER, PROJECTING 4 INCHES ABOVE GROUND.
SD0640'
SD0640'REFERENCE MARK NO. 1 IS A STANDARD PACIFIC COUNTY DISK STAMPED
SD0640'BETTY M 1976 RM 1 SET IN CONCRETE 8 INCHES IN DIAMETER, PROJECTING 4
SD0640'INCHES ABOVE GROUND.
SD0640'
SD0640'REFERENCE MARK NO. 2 IS A STANDARD PACIFIC COUNTY DISK STAMPED
SD0640'BETTY M 1976 RM 2 SET IN CONCRETE 8 INCHES IN DIAMETER, PROJECTING 4
SD0640'INCHES ABOVE GROUND.
SD0640'
SD0640'NOTE--STATION BETTY M 1976 CONTAINS STEEL BARS IN THE CONCRETE
SD0640'FOR MAGNETIC DETECTION PURPOSES.
SD0640'
SD0640'NEAREST TOWN--ILWACO.
SD0640
SD0640 STATION RECOVERY (1976)
SD0640
SD0640'RECOVERY NOTE BY PACIFIC COUNTY WASHINGTON 1976
SD0640'RECOVERED IN GOOD CONDITION.
SD0640
SD0640 STATION RECOVERY (1983)
SD0640
SD0640'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1983 (DAW)
SD0640'THE STATION IS LOCATED ABOUT 3.2 KM (2.00 MI) SOUTH OF ILWACO, AT THE
SD0640'NORTHEAST END OF THE JETTY ON THE SOUTHWEST SIDE OF BAKER BAY AND ON
SD0640'PROPERTY OF THE US COAST GUARD. TO REACH FROM THE INTERSECTION OF
SD0640'FIRST STREET AND SPRUCE STREET IN ILWACO, GO WEST ON THE
SD0640'ILWACO-NORTHHEAD ROAD FOR 0.16 KM (0.10 MI) TO A FORK. TAKE THE RIGHT
SD0640'FORK AND GO NORTHWESTERLY FOR 1.21 KM (0.75 MI) TO A CROSS ROAD. TURN
SD0640'LEFT AND GO SOUTHERLY ON THE NORTHHEAD LIGHT HOUSE ROAD FOR 1.61 KM
SD0640'(1.00 MI) TO A FORK. CONTINUE AHEAD SOUTHERLY FOR 0.80 KM (0.50 MI)
SD0640'TO A INTERSECTION. TURN LEFT FOR 0.48 KM (0.30 MI) TO THE ENTRANCE TO
SD0640'THE COAST GUARD STATION. CONTINUE AHEAD ON THE MAIN ROAD FOR 0.32 KM
SD0640'(0.20 MI) TO A BOAT HOUSE. TURN RIGHT, PASSING TO THE WEST OF THE
SD0640'BOAT HOUSE AND GO SOUTH-SOUTHEAST ON THE TRACK ROAD FOR 0.16 KM (0.10
SD0640'MI) TO THE COAST GUARD FIRING RANGE. CONTINUE SOUTHEASTERLY ON THE
SD0640'TRACK ROAD FOR 0.24 KM (0.15 MI) TO THE END OF THE ROAD AND THE
SD0640'STATION ON THE RIGHT. THE MARK IS SET IN THE TOP OF A ROUND CONCRETE
SD0640'MONUMENT THAT IS 0.61 M (2.00 FT) IN DIAMETER AND PROJECTS 0.10 M
SD0640'(0.33 FT) ABOVE THE GROUND SURFACE. IT IS 25.144 M (82.493 FT)
SD0640'EAST-SOUTHEAST OF REFERENCE MARK 1, 8.914 M (29.245 FT) SOUTHWEST OF
SD0640'REFERENCE MARK 2, 4.3 M (14.1 FT) EAST OF THE CENTER OF THE TRACK ROAD
SD0640'AND 0.9 M (3.0 FT) NORTH OF A WITNESS POST.
SD0640
SD0640 STATION RECOVERY (1989)
SD0640
SD0640'RECOVERY NOTE BY MINISTER AND GLAESER 1989
SD0640'RECOVERED IN GOOD CONDITION.
SD0640
SD0640 STATION RECOVERY (1997)
SD0640
SD0640'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0640'RECOVERED AS DESCRIBED. THE CORP OF ENGINEERS GATE IN THE 1976

SD0640'DESCRIPTION HAS BEEN REMOVED AND NO KEY IS REQUIRED. RM 2 WAS
SD0640'RECOVERED AS DESCRIBED. COE SURVEY MARKER BOAT-HUB (WITH ORANGE
SD0640'WITNESS POST) IS LOCATED ABOUT 15 M, (49.2 FT) 37 DEGREES GRID, OF THE
SD0640'STATION. RM 1 WAS NOT RECOVERED AND HAS BEEN DESTROYED. THE PLOTTED
SD0640'LOCATED OF RM 1 IS ABOUT 5 M (16.4 FT) SEAWARD OF A 2 M (6.6 FT) TALL
SD0640'EROSION SCARP LOCATED AT THE MEAN HIGH WATER LINE.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH6997 ***********************************************************************
 AH6997  DESIGNATION -  BHUX
 AH6997  PID         -  AH6997
 AH6997  STATE/COUNTY-  WA/GRAYS HARBOR
 AH6997  USGS QUAD   -  MOCLIPS (1985)
 AH6997
 AH6997                         *CURRENT SURVEY CONTROL
 AH6997  ______________________________________________________________________
 AH6997* NAD 83(1991)-  47 10 31.95563(N)    124 11 42.20405(W)     ADJUSTED
 AH6997* NAVD 88     -         5.96   (meters)      19.6    (feet)  GPS OBS
 AH6997  ______________________________________________________________________
 AH6997  X           -  -2,441,032.843 (meters)                     COMP
 AH6997  Y           -  -3,592,537.441 (meters)                     COMP
 AH6997  Z           -   4,655,038.895 (meters)                     COMP
 AH6997  LAPLACE CORR-           8.54  (seconds)                    DEFLEC96
 AH6997  ELLIP HEIGHT-         -18.55  (meters)                     GPS OBS
 AH6997  GEOID HEIGHT-         -24.33  (meters)                     GEOID96
 AH6997
 AH6997  HORZ ORDER  -  FIRST
 AH6997  ELLP ORDER  -  THIRD     CLASS II
 AH6997
 AH6997.The horizontal coordinates were established by GPS observations
 AH6997.and adjusted by the National Geodetic Survey in January 1999.
 AH6997
 AH6997.The orthometric height was determined by GPS observations and a
 AH6997.high-resolution geoid model using precise GPS observation and
 AH6997.processing techniques.
 AH6997
 AH6997.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH6997
 AH6997.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH6997
 AH6997.The ellipsoidal height was determined by GPS observations
 AH6997.and is referenced to NAD 83.
 AH6997
 AH6997.The geoid height was determined by GEOID96.
 AH6997
 AH6997;                    North         East     Units   Scale      Converg.
 AH6997;SPC WA S     -   211,327.432   220,002.033   MT  0.99996772 -2 41 02.7
 AH6997;UTM  10      - 5,225,364.600   409,443.620   MT  0.99970078 -0 52 35.6
 AH6997
 AH6997                           SUPERSEDED SURVEY CONTROL
 AH6997
 AH6997.No superseded survey control is available for this station.
 AH6997
 AH6997_MARKER: I = METAL ROD
 AH6997_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 AH6997_STAMPING: BHUX 1997
 AH6997_PROJECTION: RECESSED 10 CENTIMETERS
 AH6997_MAGNETIC: I = MARKER IS A STEEL ROD
 AH6997_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
 AH6997+STABILITY: POSITION/ELEVATION WELL
 AH6997_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH6997+SATELLITE: SATELLITE OBSERVATIONS - 1997
 AH6997_ROD/PIPE-DEPTH: 10   meters
 AH6997
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AH6997 HISTORY   - Date   Condition   Recov. By
AH6997 HISTORY   - 1997   MONUMENTED   NGS
AH6997
AH6997   STATION DESCRIPTION
AH6997
AH6997'DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH6997'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) FROM THE
AH6997'INTERSECTION OF SR 109 AND OCEAN BEACH ROAD IN PACIFIC BEACH GO SOUTH
AH6997'ON SR 109 FOR 3.4 MILES (5.5 KM) TO THE ROOSEVELT BEACH ACCESS ROAD ON
AH6997'RIGHT OR, FROM THE COPALIS RIVER BRIDGE IN COPAHLIS CROSSING, GO NORTH
AH6997'ON SR 109 4.7 MILES (7.6 KM) TO THE ROOSEVELT BEACH ACCESS ROAD ON
AH6997'LEFT. TURN WEST GOTO THE BEACH ACCESS PARKING AREA AND A WOOD FRAME
AH6997'RESTROOM ON THE NORTH SIDE OF LOT. THE STATION IS 3 M (9.8 FT) WEST
AH6997'OF THE NORTHWEST CORNER OF THE BATHROOM AND 1 M (3.3 FT) NORTH OF AN
AH6997'EXTENDED EAST/WEST LINE FORMED BY THE NORTH SIDE OF THE BATHROOM, OR
AH6997'77 M (252.6 FT) WEST OF THE CENTERLINE OF SR 109 AND 7.25 M (23.79 FT)
AH6997'NORTH OF THE CENTERLINE OF THE ROOSEVELT BEACH ACCESS ROAD. THE
AH6997'STATION IS A STAINLESS STEEL ROD DRIVEN 104 FT. (31.7 M) ACCESS TO THE
AH6997'DATUM POINT IS HAD THROUGH A 5-INCH STANDARD NGS LOGO CAP THAT IS
AH6997'STAMPED BHUX 1997.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH6995 ***********************************************************************
 AH6995  DESIGNATION -  BONE
 AH6995  PID         -  AH6995
 AH6995  STATE/COUNTY-  WA/PACIFIC
 AH6995  USGS QUAD   -  NEMAH (1985)
 AH6995
 AH6995                         *CURRENT SURVEY CONTROL
 AH6995  ______________________________________________________________________
 AH6995* NAD 83(1991)-  46 36 53.54506(N)    123 55 55.44455(W)     ADJUSTED
 AH6995* NAVD 88     -         3.76   (meters)      12.3    (feet)  GPS OBS
 AH6995  ______________________________________________________________________
 AH6995  X           -  -2,449,918.994 (meters)                     COMP
 AH6995  Y           -  -3,641,459.888 (meters)                     COMP
 AH6995  Z           -   4,612,446.738 (meters)                     COMP
 AH6995  LAPLACE CORR-          18.69  (seconds)                    DEFLEC96
 AH6995  ELLIP HEIGHT-         -19.80  (meters)                     GPS OBS
 AH6995  GEOID HEIGHT-         -23.41  (meters)                     GEOID96
 AH6995
 AH6995  HORZ ORDER  -  FIRST
 AH6995  ELLP ORDER  -  THIRD     CLASS II
 AH6995
 AH6995.The horizontal coordinates were established by GPS observations
 AH6995.and adjusted by the National Geodetic Survey in January 1999.
 AH6995
 AH6995.The orthometric height was determined by GPS observations and a
 AH6995.high-resolution geoid model using precise GPS observation and
 AH6995.processing techniques.
 AH6995
 AH6995.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH6995
 AH6995.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH6995
 AH6995.The ellipsoidal height was determined by GPS observations
 AH6995.and is referenced to NAD 83.
 AH6995
 AH6995.The geoid height was determined by GEOID96.
 AH6995
 AH6995;                    North         East     Units   Scale      Converg.
 AH6995;SPC WA S     -   148,161.257   237,206.298   MT  0.99991473 -2 29 34.9
 AH6995;UTM  10      - 5,162,789.756   428,631.607   MT  0.99966261 -0 40 38.7
 AH6995
 AH6995                           SUPERSEDED SURVEY CONTROL
 AH6995
 AH6995.No superseded survey control is available for this station.
 AH6995
 AH6995_MARKER: DD = SURVEY DISK
 AH6995_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 AH6995_STAMPING: BONE 1993
 AH6995_PROJECTION: FLUSH
 AH6995_MAGNETIC: O = OTHER; SEE DESCRIPTION
 AH6995_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AH6995+STABILITY: SURFACE MOTION
 AH6995_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH6995+SATELLITE: SATELLITE OBSERVATIONS - 1993
 AH6995
 AH6995  HISTORY     - Date     Condition        Recov. By
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AH6995  HISTORY     - 1993     MONUMENTED       WADT
AH6995  HISTORY     - 1999     GOOD             WADECO
AH6995
AH6995                          STATION DESCRIPTION
AH6995
AH6995'DESCRIBED BY WA DEPT OF TRANSP 1993
AH6995'THE STATION IS LOCATED 5 MILES (8.0 KM) SOUTH OF SOUTH BEND.  FROM
AH6995'SOUTH BEND GO SOUTHWEST ON US 101 TO THE PALIX RIVER BRIDGE. CONTINUE
AH6995'SOUTH 0.3 MILES (0.5 KM) TO INTERSECTION WITH BAY CENTER DIKE ROAD.
AH6995'GO WEST 0.95 MILES (1.53 KM) ON BAY CENTER DIKE ROAD TO STATION ON
AH6995'SOUTH SIDE OF ROAD AND GRAVEL PULL OFF.  STATION IS LOCATED 1.0 METERS
AH6995'(3.3 FT) NORTHEASAT OF A WHITE WITNESS POST, 6.9 METERS (22.6 FT)
AH6995'SOUTHWEST OF A CENTERLINE AND 30.8 METERS (101.0 FT) NORTHWEST OF A
AH6995'TELEPHONE (ATT) BOX P-12.  THE MARK IS A WSDOT BRASS DISK SET INTO A
AH6995'ROUND CONCRETE MONUMENT FLUSH WITH EXISTING GROUND SURFACE AND AT THE
AH6995'SOUTH EDGE OF THE GRAVEL PULL OFF.
AH6995
AH6995                          STATION RECOVERY (1999)
AH6995
AH6995'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH6995'RECOVERED AS DESCRIBED.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7002 ***********************************************************************
 AH7002  DESIGNATION -  BUTTER
 AH7002  PID         -  AH7002
 AH7002  STATE/COUNTY-  WA/GRAYS HARBOR
 AH7002  USGS QUAD   -  POINT BROWN (1984)
 AH7002
 AH7002                         *CURRENT SURVEY CONTROL
 AH7002  ______________________________________________________________________
 AH7002* NAD 83(1991)-  46 57 45.83003(N)    124 10 13.60090(W)     ADJUSTED
 AH7002* NAVD 88     -         5.50   (meters)      18.0    (feet)  GPS OBS
 AH7002  ______________________________________________________________________
 AH7002  X           -  -2,449,218.370 (meters)                     COMP
 AH7002  Y           -  -3,607,917.312 (meters)                     COMP
 AH7002  Z           -   4,638,924.031 (meters)                     COMP
 AH7002  LAPLACE CORR-           9.77  (seconds)                    DEFLEC96
 AH7002  ELLIP HEIGHT-         -19.26  (meters)                     GPS OBS
 AH7002  GEOID HEIGHT-         -24.60  (meters)                     GEOID96
 AH7002
 AH7002  HORZ ORDER  -  FIRST
 AH7002  ELLP ORDER  -  THIRD     CLASS II
 AH7002
 AH7002.The horizontal coordinates were established by GPS observations
 AH7002.and adjusted by the National Geodetic Survey in January 1999.
 AH7002
 AH7002.The orthometric height was determined by GPS observations and a
 AH7002.high-resolution geoid model using precise GPS observation and
 AH7002.processing techniques.
 AH7002
 AH7002.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7002
 AH7002.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7002
 AH7002.The ellipsoidal height was determined by GPS observations
 AH7002.and is referenced to NAD 83.
 AH7002
 AH7002.The geoid height was determined by GEOID96.
 AH7002
 AH7002;                    North         East     Units   Scale      Converg.
 AH7002;SPC WA S     -   187,608.277   220,765.202   MT  0.99993630 -2 39 58.3
 AH7002;UTM  10      - 5,201,687.323   410,954.826   MT  0.99969745 -0 51 20.0
 AH7002
 AH7002                           SUPERSEDED SURVEY CONTROL
 AH7002
 AH7002.No superseded survey control is available for this station.
 AH7002
 AH7002_MARKER: I = METAL ROD
 AH7002_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 AH7002_STAMPING: BUTTER 1997
 AH7002_PROJECTION: RECESSED 10 CENTIMETERS
 AH7002_MAGNETIC: I = MARKER IS A STEEL ROD
 AH7002_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
 AH7002_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7002+SATELLITE: SATELLITE OBSERVATIONS - 1997
 AH7002_ROD/PIPE-DEPTH: 10   meters
 AH7002
 AH7002  HISTORY     - Date     Condition        Recov. By
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AH7002 HISTORY   - 1997   MONUMENTED   NGS
AH7002
AH7002   STATION DESCRIPTION
AH7002
AH7002'DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH7002'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .
AH7002'THE STATION IS LOCATED IN THE CITY OF OCEAN SHORES. FROM THE
AH7002'INTERSECTION OF CHANCE ALAMER ROAD AND OCEAN SHORES BOULEVARD SW GO
AH7002'SOUTH ON OCEAN SHORES BOULEVARD TO THE INTERSECTION WITH BUTTER CLAM
AH7002'ROAD. TURN WEST AND FOLLOW BUTTER CLAM ROAD TO A BEACH ACCESS PARKING
AH7002'AREA. THE STATION IS 1 M (3.3 FT) WEST OF THE NORTHWEST CORNER OF THE
AH7002'PARKING AREA AND IS 0.6 M (2.0 FT) EAST OF A STANDARD ORANGE NGS
AH7002'WITNESS POST, OR 124 M (406.8 FT) WEST OF THE CENTERLINE OF SOUTH SAND
AH7002'DUNE AVENUE AND 15 M (49.2 FT) NORTH OF THE EXTENDED CENTERLINE OF
AH7002'BUTTER CLAM ROAD. THE STATION IS ABOUT 250 M (820.2 FT) WEST AND EVEN
AH7002'WITH AN EXTENDED EAST/WEST LINE FORMED BY THE NORTH WALL OF THE SINGLE
AH7002'STORY GRAY HOUSE AT 698 OCEAN SHORES BOULEVARD SW. THE STATION IS A
AH7002'STAINLESS STEEL ROD DRIVEN 73 FT, (22.3 M) ACCESS TO THE DATUM POINT
AH7002'IS HAD THROUGH A 5-INCH STANDARD NGS LOGO CAP THAT IS STAMPED BUTTER
AH7002'1997.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 RD4216 ***********************************************************************
 RD4216  FBN         -  This is a Candidate for Federal Base Network Control.
 RD4216  DESIGNATION -  CANN
 RD4216  PID         -  RD4216
 RD4216  STATE/COUNTY-  OR/CLATSOP
 RD4216  USGS QUAD   -  ARCH CAPE (1985)
 RD4216
 RD4216                        *CURRENT SURVEY CONTROL
 RD4216  ______________________________________________________________________
 RD4216* NAD 83(1991)-  45 51 41.99940(N)    123 57 37.19597(W)     ADJUSTED
 RD4216* NAVD 88     -        30.5    (meters)     100.     (feet)  GPS OBS
 RD4216  ______________________________________________________________________
 RD4216  X           -  -2,485,503.287 (meters)                     COMP
 RD4216  Y           -  -3,690,418.902 (meters)                     COMP
 RD4216  Z           -   4,554,558.649 (meters)                     COMP
 RD4216  LAPLACE CORR-          21.99  (seconds)                    DEFLEC96
 RD4216  ELLIP HEIGHT-           7.46  (meters)                     GPS OBS
 RD4216  GEOID HEIGHT-         -22.91  (meters)                     GEOID96
 RD4216
 RD4216  HORZ ORDER  -  B
 RD4216  ELLP ORDER  -  THIRD     CLASS II
 RD4216
 RD4216.The horizontal coordinates were established by GPS observations
 RD4216.and adjusted by the National Geodetic Survey in February 1991.
 RD4216
 RD4216.The orthometric height was determined by GPS observations.
 RD4216
 RD4216.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 RD4216
 RD4216.The Laplace correction was computed from DEFLEC96 derived deflections.
 RD4216
 RD4216.The ellipsoidal height was determined by GPS observations
 RD4216.and is referenced to NAD 83.
 RD4216
 RD4216.The geoid height was determined by GEOID96.
 RD4216
 RD4216;                     North         East     Units   Scale      Converg.
 RD4216;SPC OR N     -   249,672.798 2,231,374.855   MT  0.99996777 -2 27 14.5
 RD4216;UTM  10      - 5,079,126.242   425,454.262   MT  0.99966832 -0 41 21.2
 RD4216
 RD4216                           SUPERSEDED SURVEY CONTROL
 RD4216
 RD4216  ELLIP HT    -           7.63  (m)                      GP(       ) 4 1
 RD4216  NGVD 29     -        29.4    (m)           96.     (f) GPS OBS
 RD4216
 RD4216.Superseded values are not recommended for survey control.
 RD4216.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
 RD4216.See file dsdata.txt to determine how the superseded data were derived.
 RD4216
 RD4216_MARKER: DH = HORIZONTAL CONTROL DISK
 RD4216_SETTING: 35 = CEMENT SLAB BASE FOR CANNON
 RD4216_STAMPING: CANN 1989
 RD4216_PROJECTION: FLUSH
 RD4216_MAGNETIC: O = OTHER; SEE DESCRIPTION
 RD4216_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 RD4216+STABILITY: SURFACE MOTION
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RD4216_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
RD4216+SATELLITE: SATELLITE OBSERVATIONS - May 22, 1990
RD4216
RD4216  HISTORY     - Date     Condition        Recov. By
RD4216  HISTORY     - 1989     MONUMENTED       ORDT
RD4216  HISTORY     - 19900522 GOOD
RD4216  HISTORY     - 19970725 GOOD             WADECO
RD4216
RD4216                          STATION DESCRIPTION
RD4216
RD4216'DESCRIBED BY OREGON DEPARTMENT OF TRANSPORTATION 1989
RD4216'THE STATION IS LOCATED AT THE SOUTH ENTRANCE TO CANNON BEACH AND IN A
RD4216'SMALL PARK.
RD4216'THE STATION IS AN ORDOT PRIMARY GPS MARK STAMPED---CANN 1989---SET
RD4216'INTO A DRILL HOLE IN A 3 METER SQUARE CONCRETE BASE FOR A SMALL
RD4216'CANNON.  IT IS 25.6 M (84.0 FT) NORTH OF HIGHWAY 101, 18.0 M
RD4216'(59.1 FT) EAST OF CENTERLINE OF SOUTH HEMLOCK, 12.0 M (39.4 FT) NE OF
RD4216'ENTERING CANNON BEACH SIGN, AND 0.65 M (2.13 FT) SW OF THE NE CORNER
RD4216'OF THE CONCRETE BASE.
RD4216'DESCRIBED BY L.L. RIGGERS
RD4216
RD4216                          STATION RECOVERY (1990)
RD4216
RD4216'RECOVERED 1990
RD4216'RECOVERED IN GOOD CONDITION.
RD4216
RD4216                          STATION RECOVERY (1997)
RD4216
RD4216'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
RD4216'RECOVERED AS DESCRIBED.  STATION IS IN A SMALL ROAD SIDE RESTAREA/PARK
RD4216'LOCATED AT THE SOUTH END OF CANNON BEACH ON US 101.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SC2824 ***********************************************************************
 SC2824  CBN         -  This is a Cooperative Base Network Control Station.
 SC2824  DESIGNATION -  CENTRAL
 SC2824  PID         -  SC2824
 SC2824  STATE/COUNTY-  WA/GRAYS HARBOR
 SC2824  USGS QUAD   -  CENTRAL PARK (1986)
 SC2824
 SC2824                         *CURRENT SURVEY CONTROL
 SC2824  ______________________________________________________________________
 SC2824* NAD 83(1991)-  46 58 21.77887(N)    123 42 11.49944(W)     ADJUSTED
 SC2824* NAVD 88     -        38.31   (meters)     125.7    (feet)  GPS OBS
 SC2824  ______________________________________________________________________
 SC2824  X           -  -2,419,277.364 (meters)                     COMP
 SC2824  Y           -  -3,627,115.290 (meters)                     COMP
 SC2824  Z           -   4,639,706.992 (meters)                     COMP
 SC2824  LAPLACE CORR-          10.61  (seconds)                    DEFLEC96
 SC2824  ELLIP HEIGHT-          15.49  (meters)                     GPS OBS
 SC2824  GEOID HEIGHT-         -22.67  (meters)                     GEOID96
 SC2824
 SC2824  HORZ ORDER  -  B
 SC2824  ELLP ORDER  -  THIRD     CLASS II
 SC2824
 SC2824.The horizontal coordinates were established by GPS observations
 SC2824.and adjusted by the National Geodetic Survey in May 1991.
 SC2824
 SC2824.The orthometric height was determined by GPS observations and a
 SC2824.high-resolution geoid model using precise GPS observation and
 SC2824.processing techniques.
 SC2824
 SC2824.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SC2824
 SC2824.The Laplace correction was computed from DEFLEC96 derived deflections.
 SC2824
 SC2824.The ellipsoidal height was determined by GPS observations
 SC2824.and is referenced to NAD 83.
 SC2824
 SC2824.The geoid height was determined by GEOID96.
 SC2824
 SC2824;                    North         East     Units   Scale      Converg.
 SC2824;SPC WA S     -   187,168.502   256,336.101   MT  0.99993746 -2 19 36.4
 SC2824;UTM  10      - 5,202,372.136   446,512.131   MT  0.99963516 -0 30 50.6
 SC2824
 SC2824                           SUPERSEDED SURVEY CONTROL
 SC2824
 SC2824  ELLIP HT    -          15.62  (m)                      GP(       ) 4 1
 SC2824  NGVD 29     -        37.2    (m)          122.     (f) GPS OBS
 SC2824
 SC2824.Superseded values are not recommended for survey control.
 SC2824.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
 SC2824.See file dsdata.txt to determine how the superseded data were derived.
 SC2824
 SC2824_MARKER: DH = HORIZONTAL CONTROL DISK
 SC2824_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 SC2824_STAMPING: CENTRAL 1990
 SC2824_PROJECTION: FLUSH
 SC2824_MAGNETIC: O = OTHER; SEE DESCRIPTION
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SC2824_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SC2824+STABILITY: SURFACE MOTION
SC2824_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SC2824+SATELLITE: SATELLITE OBSERVATIONS - February 08, 1991
SC2824
SC2824  HISTORY     - Date     Condition        Recov. By
SC2824  HISTORY     - 1990     MONUMENTED       NGS
SC2824  HISTORY     - 19910208 GOOD
SC2824  HISTORY     - 19970718 GOOD             WADECO
SC2824
SC2824                          STATION DESCRIPTION
SC2824
SC2824'DESCRIBED BY NATIONAL GEODETIC SURVEY 1990
SC2824'THE STATION IS LOCATED ABOUT 40.2 KM (25.0 MI) SOUTH-SOUTHEAST OF
SC2824'HUMPTULIPS, 32.2 KM (20.0 MI) EAST-NORTHEAST OF WESTPORT, 24.1 KM
SC2824'(15.0 MI) WEST OF ELMA AND AT THE FIRE HALL IN CENTRAL PARK.
SC2824'TO REACH FROM THE INTERSECTION OF US HIGHWAY 12 AND HILL ROAD IN
SC2824'CENTRAL PARK, GO WEST ON US HIGHWAY 12 FOR 0.97 KM (0.60 MI) TO THE
SC2824'INTERSECTION OF PIONEER ROAD AND THE STATION ON THE LEFT.
SC2824'THE MARK IS SET IN THE TOP OF A ROUND CONCRETE MONUMENT THAT PROJECTS
SC2824'5 CM (2 INCHES) ABOVE THE GROUND SURFACE.  IT IS 32.0 M (105.0 FT)
SC2824'WEST OF THE NORTHWEST CORNER OF THE FIRE HALL, 31.0 M (101.7 FT) EAST
SC2824'OF THE CENTER OF PIONEER ROAD, 8.0 M (26.2 FT) SOUTH OF THE SOUTH FOG
SC2824'LINE OF US HIGHWAY 12, 1.3 M (4.3 FT) SOUTH OF THE CURB OF THE
SC2824'PARKING LOT, 0.6 M (2.0 FT) NORTH OF THE CURB OF THE BUS LANE AND 0.6
SC2824'M (2.0 FT) EAST OF A WITNESS POST.
SC2824
SC2824                          STATION RECOVERY (1991)
SC2824
SC2824'RECOVERED 1991
SC2824'RECOVERED IN GOOD CONDITION.
SC2824
SC2824                          STATION RECOVERY (1997)
SC2824
SC2824'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SC2824'RECOVERED AS DESCRIBED.  FROM MONTESANO GO WEST 5.1 MILES (8.2 KM) ON
SC2824'US 12 FROM THE INTERSECTION OF U.S.  12 AND RT 109 (BRIDGE) IN
SC2824'MONTESANO.  STATION IS ON SOUTH SIDE OF ROAD AT FIRE STATION.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0554 ***********************************************************************
 SD0554  DESIGNATION -  COTTA
 SD0554  PID         -  SD0554
 SD0554  STATE/COUNTY-  WA/PACIFIC
 SD0554  USGS QUAD   -  OCEAN PARK (1985)
 SD0554
 SD0554                         *CURRENT SURVEY CONTROL
 SD0554  ______________________________________________________________________
 SD0554* NAD 83(1991)-  46 29 53.91357(N)    124 01 54.72671(W)     ADJUSTED
 SD0554* NAVD 88     -         2.79   (meters)       9.2    (feet)  GPS OBS
 SD0554  ______________________________________________________________________
 SD0554  X           -  -2,461,522.680 (meters)                     COMP
 SD0554  Y           -  -3,644,982.610 (meters)                     COMP
 SD0554  Z           -   4,603,535.532 (meters)                     COMP
 SD0554  LAPLACE CORR-          16.31  (seconds)                    DEFLEC96
 SD0554  ELLIP HEIGHT-         -21.36  (meters)                     GPS OBS
 SD0554  GEOID HEIGHT-         -24.01  (meters)                     GEOID96
 SD0554
 SD0554  HORZ ORDER  -  FIRST
 SD0554  ELLP ORDER  -  THIRD     CLASS II
 SD0554
 SD0554.The horizontal coordinates were established by GPS observations
 SD0554.and adjusted by the National Geodetic Survey in January 1999.
 SD0554
 SD0554.The orthometric height was determined by GPS observations and a
 SD0554.high-resolution geoid model using precise GPS observation and
 SD0554.processing techniques.
 SD0554
 SD0554.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0554
 SD0554.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0554
 SD0554.The ellipsoidal height was determined by GPS observations
 SD0554.and is referenced to NAD 83.
 SD0554
 SD0554.The geoid height was determined by GEOID96.
 SD0554
 SD0554;                    North         East     Units   Scale      Converg.
 SD0554;SPC WA S     -   135,555.140   228,989.637   MT  0.99991574 -2 33 55.9
 SD0554;UTM  10      - 5,149,932.698   420,820.543   MT  0.99967706 -0 44 54.6
 SD0554
 SD0554:                Primary Azimuth Mark                     Grid Az
 SD0554:SPC WA S     -  COTTA AZ MK                              200 48 06.7
 SD0554:UTM  10      -  COTTA AZ MK                              198 59 05.4
 SD0554
 SD0554|---------------------------------------------------------------------|
 SD0554| PID    Reference Object                    Distance      Geod. Az   |
 SD0554|                                                          dddmmss.s  |
 SD0554| SD0513 NAHCOTTA OYSTER SHELL PLT STK      207.202 METERS 00941      |
 SD0554| SD0541 NAHCOTTA EAGLE OYSTER CO E GAB     372.116 METERS 06605      |
 SD0554| SC2482 ILWACO OYSTER CO HOUSE W GAB       APPROX. 7.5 KM 0671658.3  |
 SD0554| SC2468 NEMAH R ENT PILES CABIN S GAB      APPROX. 7.8 KM 0693702.4  |
 SD0554|        COTTA AZ MK                                       1981410.8  |
 SD0554|        COTTA RM 1                          31.288 METERS 24326      |
 SD0554|        SE COR OF PUMPHOUSE                 45.568 METERS 30143      |
 SD0554|        COTTA RM 2                          55.913 METERS 33316      |
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SD0554|        COTTA RM 3                              24.957 METERS 34637     |
SD0554|--------------------------------------------------------------------------|
SD0554
SD0554                            SUPERSEDED SURVEY CONTROL
SD0554
SD0554  NAD 83(1991)-  46 29 53.90979(N)    124 01 54.72873(W) AD(       ) 2
SD0554  NAD 83(1991)-  46 29 53.90908(N)    124 01 54.72825(W) AD(       ) 2
SD0554  NAD 83(1986)-  46 29 53.90978(N)    124 01 54.70874(W) AD(       ) 2
SD0554  NAD 27      -  46 29 54.55586(N)    124 01 50.12282(W) AD(       ) 2
SD0554  NGVD 29     -         1.93   (m)            6.3    (f) LEVELING    3
SD0554
SD0554.Superseded values are not recommended for survey control.
SD0554.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0554.See file dsdata.txt to determine how the superseded data were derived.
SD0554
SD0554_MARKER: DS = TRIANGULATION STATION DISK
SD0554_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
SD0554_STAMPING: COTTA 1938 1971
SD0554_PROJECTION: FLUSH
SD0554_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0554_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0554+STABILITY: SURFACE MOTION
SD0554
SD0554  HISTORY     - Date     Condition        Recov. By
SD0554  HISTORY     - 1939     MONUMENTED       CGS
SD0554  HISTORY     - 1953     MONUMENTED       CGS
SD0554  HISTORY     - 1971     MONUMENTED       NGS
SD0554  HISTORY     - 1977     MONUMENTED       WA-049
SD0554  HISTORY     - 19971015 GOOD             WADECO
SD0554
SD0554                            STATION DESCRIPTION
SD0554
SD0554'DESCRIBED BY COAST AND GEODETIC SURVEY 1939 (WMS)
SD0554'STATION IS ON MARSH GROUND BETWEEN THE OLD OREGON AND WASHINGTON
SD0554'RAILROAD PIER AND THE NEW PIER AT NAHCOTTA, ABOUT 12 METERS W OF
SD0554'THE HIGH-WATER LINE, AND 6.7 METERS W OF A LOW BANK WHICH MARKS THE
SD0554'EDGE OF HIGHER HIGH WATER.  THE STATION IS AT THE S END OF A LONG
SD0554'LOW OYSTER SHELL PILE ON SANDY GROUND GROWN UP IN WIRE GRASS AND
SD0554'175 FEET E BY N FROM THE CORNER OF A WIRE FENCE ON HIGH GROUND,
SD0554'227 FEET SE OF THE SE CORNER OF A SMALL SQUARE SHINGLED BUILDING
SD0554'SUPPORTING A SMALL TANK.
SD0554'
SD0554'SURFACE MARK IS A STANDARD DISK SET IN THE TOP END OF A CONCRETE
SD0554'POST 3 FEET LONG AND ABOUT 10 INCHES SQUARE.  THE POST PROJECTS
SD0554'ABOUT 3 INCHES.
SD0554'
SD0554'SUBSURFACE MARK IS A STANDARD DISK SET IN A LARGE MASS OF CEMENT
SD0554'PLACED 3 FEET BELOW THE SURFACE.
SD0554'
SD0554'REFERENCE MARK NO.1 IS A STANDARD REFERENCE DISK CEMENTED IN THE
SD0554'TOP END OF A 30-INCH SECTION OF 4-INCH CAST-IRON SOIL PIPE AND
SD0554'PROJECTS 2 INCHES.  IT IS ON LOW GROUND SW OF THE STATION AND 88.5
SD0554'FEET E BY S FROM THE CORNER OF FENCE MENTIONED ABOVE, STAMPED COTTA
SD0554'NO.1, 1938.
SD0554'
SD0554'REFERENCE MARK NO.2 IS MARKED THE SAME AS NO.1.  IT IS PLACED NW OF
SD0554'THE STATION ON LOW GROUND, 43.5 FEET SE OF THE CORNER OF SQUARE
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SD0554'BUILDING MENTIONED ABOVE AND 4 FEET S OF THE LINE BETWEEN THE
SD0554'STATION AND THE BUILDING, STAMPED COTTA NO.2, 1938.
SD0554'
SD0554'HEIGHT OF LIGHT ABOVE STATION MARK 8.5 METERS.
SD0554
SD0554 STATION RECOVERY (1953)
SD0554
SD0554'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1953 (FN)
SD0554'RECOVERED. STATION AND BOTH REFERENCE MARKS RECOVERED IN GOOD
SD0554'CONDITION. A COMPLETE DESCRIPTION FOLLOWS--
SD0554'
SD0554'ON THE E SIDE OF THE NORTH BEACH PENINSULA AT NAHCOTTA, ON MARSH
SD0554'GROUND BETWEEN THE OLD OREGON AND WASHINGTON RAILROAD PIER AND THE
SD0554'LONG PIER AT NAHCOTTA, 69.2 M. SE OF THE SE CORNER OF A SMALL
SD0554'SHINGLED BUILDING, 5 FT. SQUARE, AT THE SW CORNER OF A DWELLING,
SD0554'45.7 M. E OF THE SE CORNER OF A SMALL METAL BUILDING (PUMPHOUSE) 8
SD0554'FT. SQUARE, 25.2 M. SW OF THE SW CORNER OF THE WILSON PACKING
SD0554'COMPANY, 11 M. W OF THE MEAN HIGH-WATERLINE, AND 5.8 M. W OF THE
SD0554'TOP EDGE OF A LOW BANK. A STANDARD DISK, STAMPED COTTA 1938 AND
SD0554'SET IN THE TOP OF A 10-IN. SQUARE CONCRETE POST FLUSH WITH THE
SD0554'GROUND. UNDERGROUND MARK IS A STANDARD DISK, SET IN A LARGE MASS OF
SD0554'CONCRETE PLACED 3 FT. BELOW THE SURFACE.
SD0554'
SD0554'REFERENCE MARK 1 IS ON A LOW BANK SW OF THE STATION. A STANDARD
SD0554'DISK, STAMPED COTTA NO 1 1938 AND CEMENTED IN THE TOP OF A 30-IN.
SD0554'SECTION OF 4-IN. SOIL PIPE SET FLUSH WITH THE GROUND.
SD0554'
SD0554'REFERENCE MARK 2 IS NW OF THE STATION, 43.5 FT. SE OF THE SE CORNER
SD0554'OF THE SMALL SHINGLED BUILDING MENTIONED ABOVE, 1.2 M. SW OF THE
SD0554'LINE BETWEEN THE STATION AND THE BUILDING, AND 3 M. W OF A LIGHT
SD0554'POLE. A STANDARD DISK, STAMPED COTTA RM NO 2 1938 AND CEMENTED IN
SD0554'THE TOP OF A 30-IN. SECTION OF 4-IN. CAST-IRON SOIL PIPE SET FLUSH
SD0554'WITH THE GROUND.
SD0554
SD0554 STATION RECOVERY (1971)
SD0554
SD0554'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1971 (LFS)
SD0554'THE STATION MARK WAS FOUND TILTED ABOUT 25 DEGREES. REFERENCE MARK
SD0554'NO. 1 WAS RECOVERED IN GOOD CONDITION. REFERENCE MARK NO. 2 WAS
SD0554'NOT FOUND. THE SURFACE STATION MARK WAS DUG OUT AND RESET OVER THE
SD0554'UNDERGROUND MARK. REFERENCE MARK NO. 3 AND AN AZIMUTH MARK WERE
SD0554'ESTABLISHED. A COMPLETE NEW DESCRIPTION FOLLOWS--
SD0554'
SD0554'THE STATION IS ABOUT 2 BLOCKS SOUTH OF THE DOCK IN NAHCOTTA, 1 BLOCK
SD0554'NORTH AND ABOUT 150 YARDS EAST OF THE NACOTTA POST OFFICE AND
SD0554'STORE, AT THE HIGH WATER LINE, IN SECTION 27, T 12 N, R 11 W. AN
SD0554'ATTEMPT TO BULLDOZE A ROAD INTO THE WATER (PERHAPS FOR LAUNCHING
SD0554'BOATS) WAS MADE A FEW YARDS NORTH OF THE STATION, AND THIS NOW
SD0554'APPEARS MORE LIKE AN ERRODED TRENCH INTO THE BEACH.
SD0554'
SD0554'THE STATION MARK IS 149.5 FEET EAST-SOUTHEAST OF THE SOUTHEAST CORNER
SD0554'OF A SMALL, METAL PUMP-HOUSE BUILDING, 83 FEET SOUTH-SOUTHWEST OF
SD0554'THE SOUTHWEST CORNER OF STACEYS CANNERY (NO LONGER IN USE), AND 27
SD0554'FEET WEST OF THE PROJECTED WEST END OF THE CANNERY. THE STATION
SD0554'MARK IS A STANDARD DISK SET IN A SQUARE CONCRETE POST 1 INCH BELOW
SD0554'THE SURFACE OF THE GROUND. UNDERGROUND MARK IS 2.5 FEET BELOW THE
SD0554'SURFACE.

SD0554'
SD0554'REFERENCE MARK NO. 1, STAMPED COTTA NO 1 1938, IS A STANDARD DISK
SD0554'SET IN A 4-INCH SOIL PIPE FLUSH WITH THE GROUND 129 FEET
SD0554'SOUTH-SOUTHEAST OF THE SOUTHEAST CORNER OF THE PUMP HOUSE, 51 FEET
SD0554'SOUTHEAST OF THE CENTER OF A GRAVEL ROAD, 40 FEET NORTHWEST OF THE
SD0554'BANK AT THE HIGH WATER LINE AND ON A FLAT AREA SOUTHWEST OF THE
SD0554'STATION.
SD0554'
SD0554'REFERENCE MARK NO. 3, STAMPED COTTA 1939 NO 3 1971, IS A STANDARD
SD0554'DISK SET IN A ROUND CONCRETE POST WHICH PROJECTS 1 INCH. IT IS
SD0554'108 FEET EAST OF THE SOUTHEAST CORNER OF THE PUMP HOUSE AND ON LINE
SD0554'WITH THE PROJECTED SOUTH SIDE OF THE PUMP HOUSE, 77.6 FEET EAST OF A
SD0554'POWER POLE, 47.5 FEET WEST OF THE SOUTHWEST CORNER OF THE CANNERY
SD0554'AND 1.5 FEET NORTH OF THE PROJECTED SOUTH SIDE OF THE CANNERY AND 17
SD0554'FEET EAST OF A GRAVEL ROAD.
SD0554'
SD0554'THE AZIMUTH MARK, STAMPED COTTA 1939 1971, IS A STANDARD DISK SET IN
SD0554'A ROUND CONCRETE POST FLUSH WITH THE GROUND, ON PROPERTY OF THE
SD0554'WILLAPA BAY SHELLFISH LABORATORY. IT IS 11 YARDS WEST OF THE
SD0554'NORTHWEST CORNER OF THE PUMPHOUSE, 7 FEET EAST-NORTHEAST OF THE
SD0554'NORTHEAST CORNER OF THE MAIN BUILDING AND 4 FEET NORTH OF THE
SD0554'PROJECTED NORTH SIDE OF THIS BUILDING.
SD0554'
SD0554'TO REACH THE AZIMUTH MARK FROM THE NAHCOTTA STORE AND POST OFFICE, GO
SD0554'SOUTH 0.1 MILE TO THE WILLAPA BAY SHELLFISH LABORATORY ON THE
SD0554'LEFT--AND THE AZIMUTH MARK ON THE LEFT, ABOUT 50 YARDS EAST OF THE
SD0554'ROAD.
SD0554'
SD0554'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN IN NAHCOTTA.
SD0554
SD0554   STATION RECOVERY (1977)
SD0554
SD0554'RECOVERY NOTE BY PACIFIC COUNTY WASHINGTON 1977
SD0554'NO MEASUREMENTS OR OBSERVATIONS MADE DURING THIS VISIT.
SD0554'
SD0554'THE STATION WAS RECOVERED AS DESCRIBED BY L.F.S. IN 1971.
SD0554'
SD0554'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN IN NAHCOTTA.
SD0554
SD0554   STATION RECOVERY (1997)
SD0554
SD0554'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0554'RECOVERED AS DESCRIBED. THE SHEET METAL PUMP HOUSE DESCRIBED HAS BEEN
SD0554'BLOWN OVER BY WIND. PUMPS ARE STILL IN-PLACE ON CEMENT FOUNDATION
SD0554'WHICH IS ABOUT 3 FT (0.9 M) BELOW GRADE. A 2 FT (0.6 M) BY 6 FT (1.8
SD0554'M) TANK PROJECTS 3 FT (0.9 M) ABOVE THE SURFACE. REFERENCE MARK 3 IS
SD0554'14 M (45.9 FT) WEST OF THE SOUTHWEST MOST PILE OF CANNERY.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH6994 ***********************************************************************
 AH6994  DESIGNATION -  CSW 1
 AH6994  PID         -  AH6994
 AH6994  STATE/COUNTY-  WA/PACIFIC
 AH6994  USGS QUAD   -  NORTH COVE (1985)
 AH6994
 AH6994                         *CURRENT SURVEY CONTROL
 AH6994  ______________________________________________________________________
 AH6994* NAD 83(1991)-  46 44 00.31207(N)    124 03 26.77436(W)     ADJUSTED
 AH6994* NAVD 88     -        96.91   (meters)     317.9    (feet)  GPS OBS
 AH6994  ______________________________________________________________________
 AH6994  X           -  -2,452,547.809 (meters)                     COMP
 AH6994  Y           -  -3,628,200.728 (meters)                     COMP
 AH6994  Z           -   4,621,556.182 (meters)                     COMP
 AH6994  LAPLACE CORR-          15.35  (seconds)                    DEFLEC96
 AH6994  ELLIP HEIGHT-          72.67  (meters)                     GPS OBS
 AH6994  GEOID HEIGHT-         -24.10  (meters)                     GEOID96
 AH6994
 AH6994  HORZ ORDER  -  FIRST
 AH6994  ELLP ORDER  -  THIRD     CLASS II
 AH6994
 AH6994.The horizontal coordinates were established by GPS observations
 AH6994.and adjusted by the National Geodetic Survey in January 1999.
 AH6994
 AH6994.The orthometric height was determined by GPS observations and a
 AH6994.high-resolution geoid model using precise GPS observation and
 AH6994.processing techniques.
 AH6994
 AH6994.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH6994
 AH6994.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH6994
 AH6994.The ellipsoidal height was determined by GPS observations
 AH6994.and is referenced to NAD 83.
 AH6994
 AH6994.The geoid height was determined by GEOID96.
 AH6994
 AH6994;                    North         East     Units   Scale      Converg.
 AH6994;SPC WA S     -   161,750.215   228,207.248   MT  0.99991794 -2 35 02.8
 AH6994;UTM  10      - 5,176,083.641   419,209.011   MT  0.99968023 -0 46 12.1
 AH6994
 AH6994|----------------------------------------------------------------------|
 AH6994| PID    Reference Object                    Distance      Geod. Az  |
 AH6994|                                                          dddmmss.s |
 AH6994| AH7012 CSW 2                               51.639 METERS 34926     |
 AH6994|----------------------------------------------------------------------|
 AH6994
 AH6994                           SUPERSEDED SURVEY CONTROL
 AH6994
 AH6994.No superseded survey control is available for this station.
 AH6994
 AH6994_MARKER: DD = SURVEY DISK
 AH6994_SETTING: 17 = SET INTO TOP OF METAL PIPE DRIVEN INTO GROUND
 AH6994_STAMPING: CSW 1
 AH6994_PROJECTION: FLUSH
 AH6994_MAGNETIC: O = OTHER; SEE DESCRIPTION
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AH6994_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
AH6994+STABILITY: SURFACE MOTION
AH6994_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AH6994+SATELLITE: SATELLITE OBSERVATIONS - 1996
AH6994
AH6994  HISTORY     - Date     Condition        Recov. By
AH6994  HISTORY     - 1996     MONUMENTED       USGS
AH6994
AH6994                          STATION DESCRIPTION
AH6994
AH6994'DESCRIBED BY US GEOLOGICAL SURVEY 1996 (TER)
AH6994'THE STATION IS LOCATED SOUTHEAST OF NORTH COVE APPROXIMATELY 16.5 KM
AH6994'(10.25 MI) SOUTH OF WESTPORT, 23 KM (14.30 MI) NW OF SOUTH BEND AND 41
AH6994'KM (25.45 MI) NORTH OF LONG BEACH.  TO REACH THE STATION FROM THE
AH6994'INTERSECTION OF WARRENTON CANNERY ROAD AND HIGHWAY 105 TAKE HIGHWAY
AH6994'105 SOUTHEAST 1.3 MILES (2.1 KM) TOWARD TOKELAND.  TURN NORTH ON
AH6994'PRIVATE DRIVE, NAMED PANORAMA LANE, TO GATE.  THE PRIVATE DRIVE IS
AH6994'LOCATED BETWEEN MILE MARKER 20 AND 21 (APPROXIMATELY 20.8) .  PASS
AH6994'THROUGH A LOCKED GATE AND TRAVEL UP HILL 0.3 MILES (0.5 KM) TO SECOND
AH6994'LOCKED GATE.  CONTINUE THROUGH GATE ABOUT 300 METERS (984.2 FT) TO TOP
AH6994'OF HILL AND STATION.  THE STATION IS 1 METER (3.3 FT) EAST OF A
AH6994'PLASTIC WITNESS POST.  THERE ARE THREE REFERENCE MARKS FOR THIS
AH6994'STATION.  REFERENCE MARK CSW 2 IS 49.6 METERS (162.7 FT) 350 DEGREES
AH6994'TRUE OF THE STATION.  REFERENCE MARK CSW 3 IS 53.4 METERS (175.2 FT)
AH6994'080 DEGREES TRUE OF THE STATION.  REFERENCE MARK CSW 4 IS 27.6 METERS
AH6994'(90.6 FT) 202 DEGREES TRUE OF THE STATION.  THE STATION IS A STAINLESS
AH6994'STEEL ROD WITH ALUMINUM CAP DRIVEN 10 FEET (3.0 M) .  CAP IS STAMPED
AH6994'CSW 1 1996.  THE ROD IS SURROUNDED BY A PVC PIPE WHICH EXTENDS 5
AH6994'INCHES ABOVE GROUND LEVEL.  THE CAP IS LEVEL WITH THE GROUND.  THE
AH6994'REFERENCE MARKS ARE STAINLESS STEEL RODS WITH ALUMINUM CAPS DRIVEN 10
AH6994'FEET (3.0 M) AND STAMPED CSW 2, CSW 3, CSW 4.  STATION SET IN 1996.
AH6994'DESCRIBED AND SURVEYED BY WASHINGTON STATE DEPARTMENT OF ECOLOGY,
AH6994'7/1997.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7012 ***********************************************************************
 AH7012  DESIGNATION -  CSW 2
 AH7012  PID         -  AH7012
 AH7012  STATE/COUNTY-  WA/PACIFIC
 AH7012  USGS QUAD   -  NORTH COVE (1985)
 AH7012
 AH7012                         *CURRENT SURVEY CONTROL
 AH7012  ______________________________________________________________________
 AH7012* NAD 83(1991)-  46 44 01.95598(N)    124 03 27.22060(W)     ADJUSTED
 AH7012* NAVD 88     -        91.40   (meters)     299.9    (feet)  GPS OBS
 AH7012  ______________________________________________________________________
 AH7012  X           -  -2,452,532.840 (meters)                     COMP
 AH7012  Y           -  -3,628,161.667 (meters)                     COMP
 AH7012  Z           -   4,621,586.959 (meters)                     COMP
 AH7012  LAPLACE CORR-          15.36  (seconds)                    DEFLEC96
 AH7012  ELLIP HEIGHT-          67.16  (meters)                     GPS OBS
 AH7012  GEOID HEIGHT-         -24.10  (meters)                     GEOID96
 AH7012
 AH7012  HORZ ORDER  -  FIRST
 AH7012  ELLP ORDER  -  THIRD     CLASS II
 AH7012
 AH7012.The horizontal coordinates were established by GPS observations
 AH7012.and adjusted by the National Geodetic Survey in January 1999.
 AH7012
 AH7012.The orthometric height was determined by GPS observations and a
 AH7012.high-resolution geoid model using precise GPS observation and
 AH7012.processing techniques.
 AH7012
 AH7012.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7012
 AH7012.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7012
 AH7012.The ellipsoidal height was determined by GPS observations
 AH7012.and is referenced to NAD 83.
 AH7012
 AH7012.The geoid height was determined by GEOID96.
 AH7012
 AH7012;                    North         East     Units   Scale      Converg.
 AH7012;SPC WA S     -   161,801.350   228,200.073   MT  0.99991796 -2 35 03.1
 AH7012;UTM  10      - 5,176,134.510   419,200.223   MT  0.99968024 -0 46 12.5
 AH7012
 AH7012|----------------------------------------------------------------------|
 AH7012| PID    Reference Object                    Distance      Geod. Az  |
 AH7012|                                                          dddmmss.s |
 AH7012| AH6994 CSW 1                          51.639 METERS 16926     |
 AH7012|----------------------------------------------------------------------|
 AH7012
 AH7012                          SUPERSEDED SURVEY CONTROL
 AH7012
 AH7012.No superseded survey control is available for this station.
 AH7012
 AH7012_MARKER: I = METAL ROD
 AH7012_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 AH7012_STAMPING: CSW 2 1996
 AH7012_PROJECTION: RECESSED 10 CENTIMETERS
 AH7012_MAGNETIC: I = MARKER IS A STEEL ROD
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AH7012_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
AH7012_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AH7012+SATELLITE: SATELLITE OBSERVATIONS - 1996
AH7012_ROD/PIPE-DEPTH: 10   meters
AH7012
AH7012  HISTORY     - Date     Condition        Recov. By
AH7012  HISTORY     - 1996     MONUMENTED       USGS
AH7012
AH7012                          STATION DESCRIPTION
AH7012
AH7012'DESCRIBED BY US GEOLOGICAL SURVEY 1996 (TER)
AH7012'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .
AH7012'THE STATION IS LOCATED SOUTHEAST OF NORTH COVE NEAR THE CAPE
AH7012'SHOALWATER INDIAN RESERVATION.  FROM THE INTERSECTION OF WARRENTON
AH7012'CANNERY ROAD AND SR 105 IN NORTH COVE HEAD SOUTH ON SR 105 1.3 MILES
AH7012'(2.1 KM) TOWARD TOKELAND.  BETWEEN MILE POST 20 AND 21 (ABOUT 20.8)
AH7012'TURN LEFT ONTO PANORMA LANE.  PASS THROUGH GATE AND CONTINUE UP HILL
AH7012'FOR 0.3 MILES (0.5 KM) TO SECOND GATE.  PASS THROUGH GATE AND GO ABOUT
AH7012'300 M (984.2 FT) UP HILL TO STATION.  THE STATION IS ON A TALL HILL
AH7012'OVERLOOKING WILLAPA BAY AND SR 105.  THE STATION IS 87 M, (285.4 FT)
AH7012'261 DEGREES GRID, FROM A METAL STORAGE SHED, 1 M (3.3 FT) EAST OF A
AH7012'ORANGE WITNESS POST.  THERE ARE THREE REFERENCE MARKS FOR THIS
AH7012'STATION.  REFERENCE MARK CSW 1 IS 51.28 M, (168.24 FT) 170 DEGREES
AH7012'GRID, OF THE STATION.  REFERENCE MARK CSW 3 IS 77.44 M, (254.07 FT)
AH7012'121 DEGREES GRID, OF THE STATION.  REFERENCE MARK CSW 4 IS 76.44 M,
AH7012'(250.79 FT) 183 DEGREES GRID, OF THE STATION.  THE STATION IS A
AH7012'STAINLESS STEEL ROD WITH CAP DRIVEN 10 FT. (3.0 M) THE CAP IS
AH7012'SURROUNDED BY A PVC PIPE THAT EXTENDS 5 INCHES ABOVE THE GROUND.  THE
AH7012'CAP IS LEVEL WITH THE GROUND.  THE CAP IS STAMPED CSW 2 1996.  THE
AH7012'REFERENCE MARKS ARE STAINLESS STEEL RODS WITH CAPS DRIVEN 10 FT. (3.0
AH7012'M) THE CAPS ARE STAMPED CSW 1 1996, CSW 3 1996, AND CSW 4 1996.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7000 ***********************************************************************
 AH7000  DESIGNATION -  DAMONS
 AH7000  PID         -  AH7000
 AH7000  STATE/COUNTY-  WA/GRAYS HARBOR
 AH7000  USGS QUAD   -  COPALIS BEACH (1984)
 AH7000
 AH7000                        *CURRENT SURVEY CONTROL
 AH7000  ______________________________________________________________________
 AH7000* NAD 83(1991)-  47 01 01.49868(N)    124 09 55.11178(W)     ADJUSTED
 AH7000* NAVD 88     -         5.55   (meters)      18.2    (feet)  GPS OBS
 AH7000  ______________________________________________________________________
 AH7000  X           -  -2,446,413.700 (meters)                     COMP
 AH7000  Y           -  -3,604,481.027 (meters)                     COMP
 AH7000  Z           -   4,643,045.764 (meters)                     COMP
 AH7000  LAPLACE CORR-           9.44  (seconds)                    DEFLEC96
 AH7000  ELLIP HEIGHT-         -19.17  (meters)                     GPS OBS
 AH7000  GEOID HEIGHT-         -24.55  (meters)                     GEOID96
 AH7000
 AH7000  HORZ ORDER  -  FIRST
 AH7000  ELLP ORDER  -  THIRD     CLASS II
 AH7000
 AH7000.The horizontal coordinates were established by GPS observations
 AH7000.and adjusted by the National Geodetic Survey in January 1999.
 AH7000
 AH7000.The orthometric height was determined by GPS observations and a
 AH7000.high-resolution geoid model using precise GPS observation and
 AH7000.processing techniques.
 AH7000
 AH7000.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7000
 AH7000.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7000
 AH7000.The ellipsoidal height was determined by GPS observations
 AH7000.and is referenced to NAD 83.
 AH7000
 AH7000.The geoid height was determined by GEOID96.
 AH7000
 AH7000;                    North         East     Units   Scale      Converg.
 AH7000;SPC WA S     -   193,625.612   221,436.304   MT  0.99994301 -2 39 44.9
 AH7000;UTM  10      - 5,207,721.391   411,435.388   MT  0.99969640 -0 51 09.2
 AH7000
 AH7000                          SUPERSEDED SURVEY CONTROL
 AH7000
 AH7000.No superseded survey control is available for this station.
 AH7000
 AH7000_MARKER: I = METAL ROD
 AH7000_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 AH7000_STAMPING: DAMONS 1997
 AH7000_PROJECTION: RECESSED 10 CENTIMETERS
 AH7000_MAGNETIC: I = MARKER IS A STEEL ROD
 AH7000_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
 AH7000+STABILITY: POSITION/ELEVATION WELL
 AH7000_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7000+SATELLITE: SATELLITE OBSERVATIONS - 1997
 AH7000_ROD/PIPE-DEPTH: 10   meters
 AH7000
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AH7000  HISTORY     - Date     Condition        Recov. By
AH7000  HISTORY     - 1997     MONUMENTED       NGS
AH7000
AH7000                          STATION DESCRIPTION
AH7000
AH7000'DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH7000'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) .  THE
AH7000'STATION IS LOCATED IN OYHUT STATE PARK IN OYHUT AND JUST NORTH OF THE
AH7000'NORTH CORP.  BOUNDARY OF THE CITY OF OCEANS SHORES.  FROM THE
AH7000'INTERSECTION OF DAMON ROAD AND POINT BROWN AVENUE IN OCEAN SHORES GO
AH7000'WEST ON DAMON ROAD TO THE BEACH ACCESS PARKING AREA ON LEFT.  WITHIN
AH7000'THE PARKING AREA THERE IS A LARGE TRAFFIC ISLAND WITH A CEMENT BLOCK
AH7000'RESTROOM ON THE WEST END.  THE STATION IS AT THE EAST END OF THE
AH7000'ISLAND.  THE STATION IS 31 M (101.7 FT) EAST OF THE CENTER OF THE
AH7000'RESTROOMS AND 13.6 M (44.6 FT) WEST OF A STANDARD ORANGE NGS WITNESS
AH7000'POST, OR 72 METERS (236.2 FT) SOUTHEAST (141 DEGREES GRID) FROM THE
AH7000'CENTER OF THE INTERSECTION OF DAMON ROAD AND CHICHAMIN AVENUE.  THE
AH7000'STATION IS A STAINLESS STEEL ROD DRIVEN 55 FT, (16.8 M) ACCESS TO THE
AH7000'DATUM POINT IS HAD THROUGH A 5-INCH STANDARD NGS LOGO CAP THAT IS
AH7000'STAMPED DAMONS 1997.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7031 ***********************************************************************
 AH7031  DESIGNATION -  DELRAY
 AH7031  PID         -  AH7031
 AH7031  STATE/COUNTY-  OR/CLATSOP
 AH7031  USGS QUAD   -  GEARHART (1984)
 AH7031
 AH7031                         *CURRENT SURVEY CONTROL
 AH7031  ______________________________________________________________________
 AH7031* NAD 83(1991)-  46 02 52.93245(N)    123 55 41.57389(W)     ADJUSTED
 AH7031* NAVD 88     -        11.5    (meters)      38.     (feet)  GPS OBS
 AH7031  ______________________________________________________________________
 AH7031  X           -  -2,475,115.921 (meters)                     COMP
 AH7031  Y           -  -3,679,445.789 (meters)                     COMP
 AH7031  Z           -   4,568,946.485 (meters)                     COMP
 AH7031  LAPLACE CORR-          15.91  (seconds)                    DEFLEC96
 AH7031  ELLIP HEIGHT-         -11.79  (meters)                     GPS OBS
 AH7031  GEOID HEIGHT-         -23.19  (meters)                     GEOID96
 AH7031
 AH7031  HORZ ORDER  -  FIRST
 AH7031  ELLP ORDER  -  THIRD     CLASS II
 AH7031
 AH7031.The horizontal coordinates were established by GPS observations
 AH7031.and adjusted by the National Geodetic Survey in January 1999.
 AH7031
 AH7031.The orthometric height was determined by GPS observations.
 AH7031
 AH7031.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7031
 AH7031.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7031
 AH7031.The ellipsoidal height was determined by GPS observations
 AH7031.and is referenced to NAD 83.
 AH7031
 AH7031.The geoid height was determined by GEOID96.
 AH7031
 AH7031;                     North         East     Units   Scale      Converg.
 AH7031;SPC OR N     -   270,262.776 2,234,745.345   MT  1.00001257 -2 25 52.5
 AH7031;UTM  10      - 5,099,803.519   428,188.501   MT  0.99966339 -0 40 05.8
 AH7031
 AH7031                           SUPERSEDED SURVEY CONTROL
 AH7031
 AH7031.No superseded survey control is available for this station.
 AH7031
 AH7031_MARKER: I = METAL ROD
 AH7031_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 AH7031_STAMPING: DELRAY 1997
 AH7031_PROJECTION: RECESSED 10 CENTIMETERS
 AH7031_MAGNETIC: I = MARKER IS A STEEL ROD
 AH7031_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
 AH7031_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7031+SATELLITE: SATELLITE OBSERVATIONS - 1997
 AH7031_ROD/PIPE-DEPTH: 10   meters
 AH7031
 AH7031  HISTORY     - Date     Condition        Recov. By
 AH7031  HISTORY     - 1997     MONUMENTED       NGS
 AH7031
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AH7031 STATION DESCRIPTION
AH7031
AH7031'DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH7031'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .
AH7031'THE STATION IS ABOUT 2 MILES (3.2 KM) NORTH OF GEARHART AT THE DELRAY
AH7031'BEACH ACCESS. TO REACH FROM THE INTERSECTION OF US 101/26 AND PACIFIC
AH7031'WAY IN GEARHART GO NORTH 1.75 MILES (2.82 KM) ON US 101/26 TO
AH7031'HIGHLANDS ROAD. TURN LEFT (WEST) AND FOLLOW HIGHLANDS ROAD TO THE
AH7031'DELRAY BEACH ACCESS PARKING AREA (LOCATED SOUTH OF THE BEACH ACCESS
AH7031'ROAD) . THE STATION IS 68 M (223.1 FT) SOUTHWEST (224 DEGREES GRID)
AH7031'FROM THE SOUTH CORNER OF A 2 X 2 M (6.6 FT) PARK INFORMATION SIGN
AH7031'LOCATED AT THE Y INTERSECTION OF THE PARKING LOT ACCESS ROAD AND THE
AH7031'BEACH ACCESS ROAD, 10 M (32.8 FT) NORTH OF THE CENTERLINE OF THE
AH7031'PARKING LOT ACCESS ROAD, 13 M (42.7 FT) NORTHEAST (54 DEGREES GRID)
AH7031'FROM THE NORTHEAST MOST CORNER OF THE SIDEWALK AROUND THE PARKING
AH7031'AREA, AND 1 M (3.3 FT) SOUTH OF A ORANGE NGS WITNESS POST. THE
AH7031'STATION IS A STAINLESS STEEL ROD DRIVEN 64 FT, (19.5 M) ACCESS TO THE
AH7031'DATUM POINT IS HAD THROUGH A 5-INCH STANDARD NGS LOGO CAP THAT IS
AH7031'STAMPED DELRAY 1997.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH6999 ***********************************************************************
 AH6999  DESIGNATION -  DIANA
 AH6999  PID         -  AH6999
 AH6999  STATE/COUNTY-  WA/GRAYS HARBOR
 AH6999  USGS QUAD   -  COPALIS BEACH (1984)
 AH6999
 AH6999                         *CURRENT SURVEY CONTROL
 AH6999  ______________________________________________________________________
 AH6999* NAD 83(1991)-  47 04 11.89504(N)    124 10 17.95897(W)     ADJUSTED
 AH6999* NAVD 88     -         6.01   (meters)      19.7    (feet)  GPS OBS
 AH6999  ______________________________________________________________________
 AH6999  X           -  -2,444,396.177 (meters)                     COMP
 AH6999  Y           -  -3,600,650.078 (meters)                     COMP
 AH6999  Z           -   4,647,052.750 (meters)                     COMP
 AH6999  LAPLACE CORR-           9.13  (seconds)                    DEFLEC96
 AH6999  ELLIP HEIGHT-         -18.67  (meters)                     GPS OBS
 AH6999  GEOID HEIGHT-         -24.51  (meters)                     GEOID96
 AH6999
 AH6999  HORZ ORDER  -  FIRST
 AH6999  ELLP ORDER  -  THIRD     CLASS II
 AH6999
 AH6999.The horizontal coordinates were established by GPS observations
 AH6999.and adjusted by the National Geodetic Survey in January 1999.
 AH6999
 AH6999.The orthometric height was determined by GPS observations and a
 AH6999.high-resolution geoid model using precise GPS observation and
 AH6999.processing techniques.
 AH6999
 AH6999.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH6999
 AH6999.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH6999
 AH6999.The ellipsoidal height was determined by GPS observations
 AH6999.and is referenced to NAD 83.
 AH6999
 AH6999.The geoid height was determined by GEOID96.
 AH6999
 AH6999;                    North         East     Units   Scale      Converg.
 AH6999;SPC WA S     -   199,520.997   221,227.901   MT  0.99995040 -2 40 01.5
 AH6999;UTM  10      - 5,213,605.785   411,041.028   MT  0.99969726 -0 51 28.5
 AH6999
 AH6999                           SUPERSEDED SURVEY CONTROL
 AH6999
 AH6999.No superseded survey control is available for this station.
 AH6999
 AH6999_MARKER: I = METAL ROD
 AH6999_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 AH6999_STAMPING: DIANA 1997
 AH6999_PROJECTION: RECESSED 10 CENTIMETERS
 AH6999_MAGNETIC: I = MARKER IS A STEEL ROD
 AH6999_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
 AH6999+STABILITY: POSITION/ELEVATION WELL
 AH6999_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH6999+SATELLITE: SATELLITE OBSERVATIONS - 1997
 AH6999_ROD/PIPE-DEPTH: 10   meters
 AH6999
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AH6999 HISTORY   - Date   Condition   Recov. By
AH6999 HISTORY   - 1997   MONUMENTED   NGS
AH6999
AH6999   STATION DESCRIPTION
AH6999
AH6999'DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH6999'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) THE
AH6999'STATION IS LOCATED WITHIN OCEAN CITY STATE PARK. FROM THE
AH6999'INTERSECTION OF SR 109 AND SECOND STREET IN OCEAN CITY GO WEST ON
AH6999'SECOND STREET TO THE BEACH ACCESS PARKING AREA ON LEFT. THE STATION
AH6999'IS IN THE SOUTHWEST CORNER OF THE PARKING LOT, 12 M (39.4 FT) SOUTH OF
AH6999'THE EDGE OF THE PAVEMENT, CENTERED ON THE THREE TRAFFIC ISLANDS THAT
AH6999'ARE NORTH AND ON-LINE WITH THE STATION, AND 1 METER (3.3 FT) NORTH OF
AH6999'A ORANGE NGS WITNESS POST. THE STATION IS 81 METERS (265.7 FT)
AH6999'SOUTWEST (245 DEGREES GRID) FROM THE SOUTHWEST CORNER OF THE CEMENT
AH6999'BLOCK BATHROOM LOCATED ON THE NORTH SIDE OF THE PARKING LOT AND WEST
AH6999'OF, AND ON-LINE WITH, THE CENTER OF A TWO STORY RED AND WHITE HOUSE
AH6999'WITH A TRIANGULAR A-FRAME TYPE GABLE. THE STATION IS A STAINLESS
AH6999'STEEL ROD DRIVEN 54 FT. (16.5 M) ACCESS TO THE DATUM POINT IS HAD
AH6999'THROUGH A 5-INCH STANDARD NGS LOGO CAP THAT IS STAMPED DIANA 1997.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0651 ***********************************************************************
 SD0651  DESIGNATION -  EAST JETTY 2
 SD0651  PID         -  SD0651
 SD0651  STATE/COUNTY-  OR/CLATSOP
 SD0651  USGS QUAD   -  CLATSOP SPIT (1985)
 SD0651
 SD0651                         *CURRENT SURVEY CONTROL
 SD0651  ______________________________________________________________________
 SD0651* NAD 83(1991)-  46 13 31.35020(N)    124 00 30.59244(W)     ADJUSTED
 SD0651* NAVD 88     -         9.8    (meters)      32.     (feet)  GPS OBS
 SD0651  ______________________________________________________________________
 SD0651  X           -  -2,472,319.115 (meters)                     COMP
 SD0651  Y           -  -3,664,191.425 (meters)                     COMP
 SD0651  Z           -   4,582,603.808 (meters)                     COMP
 SD0651  LAPLACE CORR-          13.62  (seconds)                    DEFLEC96
 SD0651  ELLIP HEIGHT-         -14.26  (meters)                     GPS OBS
 SD0651  GEOID HEIGHT-         -23.93  (meters)                     GEOID96
 SD0651
 SD0651  HORZ ORDER  -  FIRST
 SD0651  ELLP ORDER  -  THIRD     CLASS II
 SD0651
 SD0651.The horizontal coordinates were established by GPS observations
 SD0651.and adjusted by the National Geodetic Survey in January 1999.
 SD0651
 SD0651.The orthometric height was determined by GPS observations.
 SD0651
 SD0651.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0651
 SD0651.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0651
 SD0651.The ellipsoidal height was determined by GPS observations
 SD0651.and is referenced to NAD 83.
 SD0651
 SD0651.The geoid height was determined by GEOID96.
 SD0651
 SD0651;                     North         East     Units   Scale      Converg.
 SD0651;SPC OR N     -   290,223.468 2,229,393.184   MT  1.00006515 -2 29 17.4
 SD0651;SPC WA S     -   105,168.514   229,432.797   MT  0.99993420 -2 32 54.8
 SD0651;UTM  10      - 5,119,582.953   422,227.501   MT  0.99967435 -0 43 41.7
 SD0651
 SD0651:                Primary Azimuth Mark                    Grid Az
 SD0651:SPC OR N     -  ASTOR COLUMN                            110 48 18.9
 SD0651:SPC WA S     -  ASTOR COLUMN                            110 51 56.3
 SD0651:UTM  10      -  ASTOR COLUMN                            109 02 43.2
 SD0651
 SD0651|-----------------------------------------------------------------------|
 SD0651| PID    Reference Object                    Distance      Geod. Az   |
 SD0651|                                                          dddmmss.s  |
 SD0651| SD0575 SAND ISLAND LOWER DIKE LIGHT      APPROX. 3.9 KM 0002444.2  |
 SD0651| SD0652 YELLOW IRON CROSS                   2.551 METERS 00812      |
 SD0651| SC2267 SAND ISLAND MIDDLE DIKE LIGHT     APPROX. 3.9 KM 0145248.6  |
 SD0651| SC2263 SAND ISLAND RANGE FRONT LT        APPROX. 4.7 KM 0145535.9  |
 SD0651| SC2273 SAND ISLAND LOOKOUT TOWER M-4     APPROX. 4.4 KM 0183031.2  |
 SD0651| SC2306 SAND ISLAND RANGE REAR LIGHT      APPROX. 5.1 KM 0242029.4  |
 SD0651|        EAST JETTY 2 RM 3                                 04415      |
 SD0651| SC2292 BAKER BAY EAST CHANNEL LT 2       APPROX. 5.1 KM 0513042.2  |
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SD0651| SC2294 CHINOOK DIKE LIGHT 1958            APPROX. 5.0 KM 0572109.4 |
SD0651| SC2203 DESDEMONA SANDS LIGHT              APPROX. 4.1 KM 0901539.7 |
SD0651| SC2000 ASTOR COLUMN                       APPROX.15.5 KM 1081901.5 |
SD0651|        EAST JETTY 2 RM 1                    9.082 METERS 15942     |
SD0651|        EAST JETTY 2 RM 2                   43.392 METERS 25118     |
SD0651| SD0657 CLATSOP SPIT COAST GUARD LOT       381.930 METERS 28503     |
SD0651| SD0595 CAPE DISAPPOINTMENT LH             APPROX. 6.5 KM 3290304.4 |
SD0651| SD0614 COLUMBIA RIV ENT RNG FRONT LT      APPROX. 6.5 KM 3292702.2 |
SD0651| SD0616 BAKER BAY W CHANNEL W JETTY LT     APPROX. 5.1 KM 3340938.5 |
SD0651| SD0615 COLUMBIA RIV ENT S RANGE FRONT     APPROX. 6.3 KM 3352721.4 |
SD0651| SD0577 BAKER BAY W CHANNEL E JETTY LT     APPROX. 5.0 KM 3385125.3 |
SD0651| SD0584 SAND ISLAND LOOKOUT TOWER M-5      APPROX. 4.5 KM 3565330.6 |
SD0651|-------------------------------------------------------------------|
SD0651
SD0651                          SUPERSEDED SURVEY CONTROL
SD0651
SD0651  NAD 83(1991)-  46 13 31.35209(N)    124 00 30.59327(W) AD(       ) 2
SD0651  NAD 83(1986)-  46 13 31.36005(N)    124 00 30.56712(W) AD(       ) 2
SD0651  NAD 27      -  46 13 31.99670(N)    124 00 26.02906(W) AD(       ) 2
SD0651  NGVD 29     -        10.2    (m)           33.     (f) VERT ANG
SD0651
SD0651.Superseded values are not recommended for survey control.
SD0651.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0651.See file dsdata.txt to determine how the superseded data were derived.
SD0651
SD0651_MARKER: DS = TRIANGULATION STATION DISK
SD0651_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
SD0651_STAMPING: EAST JETTY 2 1948
SD0651_PROJECTION: FLUSH
SD0651_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0651_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0651+STABILITY: SURFACE MOTION
SD0651_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SD0651+SATELLITE: SATELLITE OBSERVATIONS - September 29, 1998
SD0651
SD0651  HISTORY     - Date     Condition        Recov. By
SD0651  HISTORY     - 1948     MONUMENTED       USE
SD0651  HISTORY     - 1956     GOOD             USE
SD0651  HISTORY     - 1958     GOOD             CGS
SD0651  HISTORY     - 1971     GOOD             NGS
SD0651  HISTORY     - 1972     GOOD             NGS
SD0651  HISTORY     - 1977     GOOD             USGS
SD0651  HISTORY     - 19881213 GOOD             MGSINC
SD0651  HISTORY     - 19971204 GOOD             WADECO
SD0651  HISTORY     - 19980929 GOOD             WADOE
SD0651
SD0651                          STATION DESCRIPTION
SD0651
SD0651'DESCRIBED BY US ENGINEERS 1956 (FN)
SD0651'THE STATION IS LOCATED ABOUT 3.5 MILES NORTHWEST OF HAMMOND, ABOUT
SD0651'0.5 MILE SOUTH OF THE NORTH END OF CLATSOP SPIT, ABOUT 1200 FEET
SD0651'SOUTHWEST OF A COAST GUARD LOOKOUT TOWER, ABOUT 300 FEET NORTH OF
SD0651'WHERE THE ROAD CROSSES AN ABANDONED RAILROAD TRESTLE, ABOUT 150
SD0651'FEET EAST-NORTHEAST OF FOUR LARGE CONCRETE FOOTINGS WHICH
SD0651'SUPPORTED A DISMANTLED WATER TANK, ON A GRASS COVERED SAND DUNE.
SD0651'THE STATION IS A BRONZE U.S. ARMY ENGINEERS DISK STAMPED
SD0651'EAST JETTY 2 1948 SET IN THE TOP OF AN 8X8 INCH CONCRETE
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SD0651'MONUMENT PROJECTING ABOUT 8 INCHES ABOVE THE SURFACE.
SD0651'
SD0651'A YELLOW IRON CROSS ABOUT 12 FEET HIGH CONSTRUCTED OF 6 INCH IRON
SD0651'PIPE AND SET IN A 3X3 FOOT CONCRETE BLOCK IS 8.2 FEET NORTH OF THE
SD0651'STATION.
SD0651'
SD0651'REFERENCE MARK NO. 1 IS A STANDARD DISK STAMPED EAST JETTY
SD0651'NO 1 1956 SET IN THE TOP OF AN 8X8 INCH CONCRETE MONUMENT PROJECTING
SD0651'ABOUT 8 INCHES. IT IS SOUTHEAST OF AND ABOUT 1 FOOT LOWER THAN THE
SD0651'STATION.
SD0651'
SD0651'REFERENCE MARK NO. 2 IS A U.S. ENGINEERS DISK STAMPED E. JETTY 2
SD0651'1956 RM BM SET IN THE TOP OF THE NORTHWESTERLY ONE OF FOUR CONCRETE
SD0651'FOOTINGS WHICH WERE USED TO SUPPORT A DISMANTLED WATER TANK. THE
SD0651'FOOTING IS APPROXIMATELY 30X30 INCHES AND PROJECT ABOUT 3 FEET.
SD0651'
SD0651'TO REACH THE STATION FROM THE POST OFFICE AT HAMMOND GO WEST 0.4
SD0651'MILE TO THE OLD ENTRANCE TO FORT STEVENS, CONTINUE NORTHWESTERLY
SD0651'FOR 0.3 MILE TO AN INTERSECTION AT THE NORTH END OF THE OLD
SD0651'PARADE GROUNDS, TURN LEFT AND GO SOUTH 0.6 MILE TO A FORK, TAKE
SD0651'THE RIGHT FORK WESTERLY FOR 0.5 MILE TO A T-ROAD SOUTH,
SD0651'CONTINUE WESTERLY 0.1 MILE TO A FORK, TAKE THE RIGHT FORK
SD0651'NORTH 0.6 MILE TO A T-ROAD WEST, TURN LEFT AND FOLLOW THE MAIN
SD0651'TRAVELED ROAD WEST 0.6 MILE TO A FORK, TAKE THE LEFT FORK
SD0651'WESTERLY 0.2 MILE TO WHERE THE ROAD MAKES A SHARP BEND TO THE
SD0651'NORTHWEST, CONTINUE NORTHERLY ON THE MAIN TRAVELED ROAD 1.3
SD0651'MILES TO AN OLD CONCRETE BUILDING FOUNDATION ON THE LEFT
SD0651'(WEST), CONTINUE NORTHWESTERLY ABOUT 0.6 MILE TO THE END OF
SD0651'TRAVEL BY STANDARD DRIVE VEHICLES, CONTINUE NORTHWESTERLY
SD0651'ABOUT 0.1 MILE THROUGH AN AREA CLUTTERED WITH DRIFTWOOD AND
SD0651'LOGS TOWARD AN OLD WOODEN TOWER ABOUT 20 FEET HIGH. AN
SD0651'OLD ROAD NORTHWARD FROM THE BEACH CROSSES AN ABANDONED
SD0651'RAILROAD TRESTLE ABOUT 200 FEET WEST OF THE TOWER.
SD0651'FOLLOW THE ROAD NORTH ABOUT 150 FEET TO A FORK, TAKE THE RIGHT
SD0651'FORK NORTH ABOUT 300 FEET TO THE STATION ON THE RIGHT
SD0651'ABOUT 50 FEET EAST OF THE CENTERLINE OF THE ROAD.
SD0651'
SD0651'HEIGHT OF LIGHT ABOVE STATION MARK 8 METERS.
SD0651
SD0651   STATION RECOVERY (1958)
SD0651
SD0651'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1958 (VRS)
SD0651'STATION AND BOTH REFERENCE MARKS RECOVERED AS DESCRIBED BY
SD0651'F.N. IN 1956.
SD0651'
SD0651'STANDARD DRIVE VEHICLES MAY NOW TRAVEL THE SOUTH JETTY APPROACH
SD0651'ROAD TO A PARKING LOT WHICH IS ABOUT A FIFTEEN MINUTE PACK SOUTH
SD0651'OF THE STATION.
SD0651'
SD0651'NOTE--THE DISCREPANCIES IN DISTANCES WERE NOTED AND CHECKED IN
SD0651'THE FIELD. THE 1958 DISTANCES ARE CORRECT.
SD0651
SD0651   STATION RECOVERY (1971)
SD0651
SD0651'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1971 (LFS)
SD0651'THE STATION MARK AND REFERENCE MARK NO. 1 WERE RECOVERED IN GOOD
SD0651'CONDITION. THE DISK HAS BEEN CHISELED OFF REFERENCE MARK NO. 2 AND

SD0651'ONLY THE STEM OF THE DISK REMAINS IN THE NORTH CORNER OF THE NORTH
SD0651'CONCRETE FOOTING OF THE DISMANTLED WATER TANK.
SD0651'
SD0651'THE STATION IS ABOUT 3.5 MILES NORTHWEST OF HAMMOND, 0.5 MILE SOUTH
SD0651'OF THE NORTH END OF CLATSOP SPIT, 1/4 MILE EAST OF KLATSOP SPIT
SD0651'COAST GUARD LOOKOUT TOWER, (A 75-FOOT HIGH SKELETON STEEL STRUCTURE
SD0651'WITH ENCLOSED CAB), 150 FEET EAST-NORTHEAST OF 3 LARGE CONCRETE
SD0651'FOOTINGS FOR A DISMANTELED WATER TANK AND ON A LOW,
SD0651'GRASS-COVERED, NORTH-SOUTH SAND RIDGE, 8.2 FEET SOUTH OF A
SD0651'12-FOOT HIGH CROSS MADE OF 6-INCH PIPE AND SET IN A 3-FOOT
SD0651'SQUARE CONCRETE BLOCK AND 1.5 FEET SOUTHWEST OF A METAL WITNESS
SD0651'POST.
SD0651'
SD0651'TO REACH FROM THE POST OFFICE IN HAMMOND, GO WEST ON PACIFIC
SD0651'STREET FOR 0.25 MILE TO WILLOW STREET, CONTINUE STRAIGHT AHEAD
SD0651'0.2 MILE TO A SIDE ROAD LEFT, TURN LEFT AND FOLLOW WINDING ROAD
SD0651'0.2 MILE TO A T-INTERSECTION, KEEP LEFT 0.3 MILE TO A FORK AT THE
SD0651'SOUTHWEST CORNER OF A CEMETERY, KEEP RIGHT FORK AND FOLLOW THE
SD0651'MAIN BLACKTOP ROAD WEST AND NORTHWEST FOR 1.8 MILES TO A
SD0651'BLACKTOP ROAD LEFT (STATION CHUMMY IS ABOUT 200 FEET SOUTHWEST
SD0651'OF THIS INTERSECTION), CONTINUE NORTHERLY ON THE BLACKTOP
SD0651'ROAD FOR 1.65 MILES TO A BLACKTOP ROAD LEFT ON A CURVE TO THE
SD0651'RIGHT, TURN LEFT AND GO WEST 0.05 MILE TO THE WEST EDGE OF A
SD0651'LOW AREA, THEN SOUTH 0.1 MILE TO THE STATION.
SD0651'
SD0651'THE STATION MARK, STAMPED EAST JETTY 2 1948, IS AN ARMY
SD0651'ENGINEERS CONTROL STATION DISK SET IN AN 8-INCH SQUARE CONCRETE
SD0651'POST WHICH PROJECTS 2 INCHES.
SD0651'
SD0651'REFERENCE MARK NO. 1, STAMPED EAST JETTY NO 1 1956, IS A
SD0651'STANDARD U.S.C. AND G.S. DISK SET IN A SQUARE CONCRETE POST 3
SD0651'INCHES BELOW GROUND. IT IS 37.5 FEET SOUTH-SOUTHEAST OF THE
SD0651'12-FOOT HIGH CROSS, 3 FEET WEST OF THE EASTERN EDGE OF THE SAND
SD0651'DUNE, 29.7 FEET SOUTH-SOUTHEAST OF AND ABOUT 1 FOOT LOWER THAN
SD0651'THE STATION MARK.
SD0651'
SD0651'THE DISK HAS BEEN CHISELED OFF REFERENCE MARK NO. 2, BUT THE
SD0651'STEM REMAINS IN THE NORTH CORNER OF THE NORTHERN CONCRETE FOOTING,
SD0651'141.5 FEET SOUTHWEST OF THE STATION. THESE CONCRETE FOOTINGS
SD0651'PROJECT ABOUT 3 FEET ABOVE GROUND.
SD0651'
SD0651'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN
SD0651'3.5 MILES NORTHWEST OF HAMMOND.
SD0651
SD0651   STATION RECOVERY (1972)
SD0651
SD0651'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1972 (LFS)
SD0651'THE STATION MARK, AND REFERENCE MARK NO. 1 WERE RECOVERED IN GOOD
SD0651'CONDITION. REFERENCE MARK NO. 2 HAD BEEN DESTROYED. REFERENCE
SD0651'MARK NO. 3 WAS ESTABLISHED. LANDMARKS HAVE CHANGED. A NEW AND
SD0651'COMPLETE DESCRIPTION FOLLOWS.
SD0651'
SD0651'THE STATION IS 3 MILES NORTHWEST OF HAMMOND ON GOVERNMENT OWNED
SD0651'LAND.
SD0651'
SD0651'TO REACH THE STATION FROM THE HAMMOND POST OFFICE GO SOUTHWEST
SD0651'ON PACIFIC AVENUE FOR 0.5 MILE TO A SIDE ROAD LEFT, AND SIGN,

SD0651'SOUTH JETTY, TURN LEFT AS PER SIGN, AND GO SOUTHWEST, AND SOUTH
SD0651'ON THE MACADAM ROAD FOR 0.5 MILE TO A FORK, JUST WEST OF THE
SD0651'FORT STEVENS ARMY CEMETERY, TAKE THE RIGHT FORK, AND GO WEST,
SD0651'AND NORTHWEST ON THE MACADAM ROAD FOR 1.7 MILE TO THE CORPS OF
SD0651'ENGINEERS TOWER OVER TRIANGULATION STATION CHUMMY 1956, ON THE
SD0651'LEFT. CONTINUE NORTH ON THE MACADAM ROAD FOR 1.7 MILES TO A
SD0651'SIDE ROAD LEFT, TURN LEFT, AND GO WEST FOR 0.05 MILE TO A SAND
SD0651'TRACK ROAD ON THE LEFT, TURN LEFT, AND GO SOUTH ON THE SAND
SD0651'ROAD FOR 0.1 MILE TO THE STATION.
SD0651'
SD0651'THE STATION MARK, STAMPED EAST JETTY 2 1948, IS A U.S. ENGINEERS
SD0651'DISK SET IN A 7-INCH SQUARE CONCRETE MONUMENT THAT PROJECTS 1
SD0651'INCH, 80 FEET WEST OF THE SAND TRACK ROAD, 8.5 FEET SOUTHWEST
SD0651'OF AN IRON CROSS THAT IS 8 FEET HIGH, AND SET IN A CONCRETE BASE,
SD0651'AND 2 FEET WEST OF A METAL WITNESS POST.
SD0651'
SD0651'REFERENCE MARK NO. 1, STAMPED EAST JETTY 2 NO 1 1956, IS A
SD0651'STANDARD DISK SET IN AN 8-INCH SQUARE CONCRETE MONUMENT THAT IS
SD0651'2 INCHES BELOW THE SURFACE, 38 FEET SOUTHEAST OF THE IRON CROSS,
SD0651'30 FEET SOUTHEAST OF THE WITNESS POST, AND 3 FEET WEST OF THE TOP
SD0651'OF THE BANK. (NOTE 11A)
SD0651'
SD0651'REFERENCE MARK NO. 3, STAMPED EAST JETTY 2 USE 1956 NO 3 1972,
SD0651'IS A STANDARD DISK SET IN A 10-INCH SQUARE CONCRETE MONUMENT
SD0651'THAT PROJECTS 4 INCHES, 62 FEET NORTHEAST OF THE WITNESS POST,
SD0651'56 FEET NORTHEAST OF THE CROSS, AND 7 FEET WEST OF THE TOP OF
SD0651'THE BANK. (NOTE 11A)
SD0651'
SD0651'DISTANCE BETWEEN R.M. NO. 1, AND R.M. NO. 3 IS 80.80 FEET OR
SD0651'24.628 METERS.
SD0651'
SD0651'LOCAL OBJECTS WILL SERVE FOR AZIMUTH CONTROL.
SD0651'
SD0651'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN
SD0651'3 MILES NORTHWEST OF HAMMOND.
SD0651
SD0651   STATION RECOVERY (1977)
SD0651
SD0651'RECOVERY NOTE BY US GEOLOGICAL SURVEY 1977
SD0651'THE LAND THAT THE STATION IS ON IS NOW IN FT STEVENS STATE
SD0651'PARK. A GOOD BLACKTOP ROAD CAN BE DRIVEN ALMOST TO THE
SD0651'STATION. THE STATION IS 0.2 MILE FROM THE PARKING LOT AT THE END
SD0651'OF THE ROAD ON THE SOUTH JETTY AND ABOUT 150 YARDS SOUTH ALONG
SD0651'AN OLD ROAD THROUGH ROLLING SAND HILLS. THE YELLOW IRON CROSS
SD0651'IS STILL IN THE SAME POSITION AND IS EASILY SEEN FROM THE
SD0651'BLACKTOP ROAD.
SD0651
SD0651   STATION RECOVERY (1988)
SD0651
SD0651'RECOVERY NOTE BY MINISTER AND GLAESER 1988
SD0651'RECOVERED IN GOOD CONDITION.
SD0651
SD0651   STATION RECOVERY (1997)
SD0651
SD0651'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0651'RECOVERED AS DESCRIBED. YELLOW CROSS IS NOW A NICE SHADE OF BROWN.
SD0651'STATION IS RECESSED IN THE GROUND ABOUT 30 CM.

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SD0651
SD0651                          STATION RECOVERY (1998)
SD0651
SD0651'RECOVERY NOTE BY WA STATE DEPT ECOLOGY 1998 (RCD)
SD0651'RECOVERED AS DESCRIBED.  CROSS CONSTRUCTED FROM 8 INCH STEEL PIPE IS
SD0651'NOW A NICE SHADE OF BROWN.  STATION IS RECESSED IN THE GROUND ABOUT 30
SD0651'CM AND IS DUE SOUTH (MAGNETIC) OF THE CROSS.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7001 ***********************************************************************
 AH7001  DESIGNATION -  ET
 AH7001  PID         -  AH7001
 AH7001  STATE/COUNTY-  WA/GRAYS HARBOR
 AH7001  USGS QUAD   -  POINT BROWN (1984)
 AH7001
 AH7001                         *CURRENT SURVEY CONTROL
 AH7001  ______________________________________________________________________
 AH7001* NAD 83(1991)-  46 59 37.24579(N)    124 10 09.26176(W)     ADJUSTED
 AH7001* NAVD 88     -         8.55   (meters)      28.1    (feet)  GPS OBS
 AH7001  ______________________________________________________________________
 AH7001  X           -  -2,447,730.903 (meters)                     COMP
 AH7001  Y           -  -3,605,889.376 (meters)                     COMP
 AH7001  Z           -   4,641,273.703 (meters)                     COMP
 AH7001  LAPLACE CORR-           9.50  (seconds)                    DEFLEC96
 AH7001  ELLIP HEIGHT-         -16.19  (meters)                     GPS OBS
 AH7001  GEOID HEIGHT-         -24.58  (meters)                     GEOID96
 AH7001
 AH7001  HORZ ORDER  -  FIRST
 AH7001  ELLP ORDER  -  THIRD     CLASS II
 AH7001
 AH7001.The horizontal coordinates were established by GPS observations
 AH7001.and adjusted by the National Geodetic Survey in January 1999.
 AH7001
 AH7001.The orthometric height was determined by GPS observations and a
 AH7001.high-resolution geoid model using precise GPS observation and
 AH7001.processing techniques.
 AH7001
 AH7001.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7001
 AH7001.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7001
 AH7001.The ellipsoidal height was determined by GPS observations
 AH7001.and is referenced to NAD 83.
 AH7001
 AH7001.The geoid height was determined by GEOID96.
 AH7001
 AH7001;                    North         East     Units   Scale      Converg.
 AH7001;SPC WA S     -   191,040.669   221,016.816   MT  0.99994001 -2 39 55.2
 AH7001;UTM  10      - 5,205,125.123   411,097.841   MT  0.99969714 -0 51 18.3
 AH7001
 AH7001                           SUPERSEDED SURVEY CONTROL
 AH7001
 AH7001.No superseded survey control is available for this station.
 AH7001
 AH7001_MARKER: DD = SURVEY DISK
 AH7001_SETTING: 4 = OBJECT SURROUNDED BY MASS OF CONCRETE
 AH7001_STAMPING: ET 1988
 AH7001_PROJECTION: FLUSH
 AH7001_MAGNETIC: O = OTHER; SEE DESCRIPTION
 AH7001_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AH7001+STABILITY: SURFACE MOTION
 AH7001_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7001+SATELLITE: SATELLITE OBSERVATIONS - 1988
 AH7001
 AH7001  HISTORY     - Date     Condition        Recov. By
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AH7001 HISTORY   - 1988   MONUMENTED   USE
AH7001
AH7001   STATION DESCRIPTION
AH7001
AH7001'DESCRIBED BY US ENGINEERS 1988
AH7001'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .
AH7001'THE STATION IS LOCATED IN THE CITY OF OCEAN SHORES. FROM SR 115 AND
AH7001'POINT BROWN AVENUE FOLLOW POINT BROWN AVENUE SOUTH TO CHANGE ALAMER
AH7001'ROAD. TURN WEST AND PROCEED TO OCEAN SHORES BOULEVARD SW. TURN SOUTH
AH7001'AND FOLLOW OCEAN SHORES BOULEVARD TO PACIFIC BOULEVARD. TURN WEST AND
AH7001'FOLLOW PACIFIC BOULEVARD TOWARD BEACH AND STATION ON LEFT. THE STATION
AH7001'IS ON A LINEAR SAND DUNE 0.15 MILES (0.24 KM) WEST OF THE CENTERLINE
AH7001'OF OCEAN SHORES BOULEVARD, 4 M (13.1 FT) HIGHER AND 21 M (68.9 FT)
AH7001'SOUTH OF THE CENTERLINE OF PACIFIC BOULEVARD, 0.75 M (2.46 FT)
AH7001'SOUTHEAST OF A 4 M (13.1 FT) TALL 4X4 WOOD FLAG POLE, AND 0.6 M (2.0
AH7001'FT) NORTH OF A METAL U.S. ARMY CORP OF ENGINEERS WITNESS POST. THE
AH7001'STATION IS A U.S. ARMY CORP OF ENGINEERS BRASS DISK SET IN A
AH7001'IRREGULAR MASS OF CONCRETE. THE DISK IS STAMPED ET 1988.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SC0916 ***********************************************************************
 SC0916  TIDAL BM    -  This is a Tidal Bench Mark.
 SC0916  DESIGNATION -  FLAG
 SC0916  PID         -  SC0916
 SC0916  STATE/COUNTY-  WA/PACIFIC
 SC0916  USGS QUAD   -  BAY CENTER (1984)
 SC0916
 SC0916                         *CURRENT SURVEY CONTROL
 SC0916  ______________________________________________________________________
 SC0916* NAD 83(1991)-  46 42 17.81267(N)    123 58 15.28231(W)     ADJUSTED
 SC0916* NAVD 88     -         4.095  (meters)      13.44   (feet)  ADJUSTED
 SC0916  ______________________________________________________________________
 SC0916  X           -  -2,448,318.021 (meters)                     COMP
 SC0916  Y           -  -3,633,758.753 (meters)                     COMP
 SC0916  Z           -   4,619,319.032 (meters)                     COMP
 SC0916  LAPLACE CORR-          16.25  (seconds)                    DEFLEC96
 SC0916  ELLIP HEIGHT-         -19.67  (meters)                     GPS OBS
 SC0916  GEOID HEIGHT-         -23.64  (meters)                     GEOID96
 SC0916  DYNAMIC HT  -           4.095 (meters)      13.44  (feet)  COMP
 SC0916  MODELED GRAV-     980,749.1   (mgal)                       NAVD 88
 SC0916
 SC0916  HORZ ORDER  -  FIRST
 SC0916  VERT ORDER  -  FIRST     CLASS II
 SC0916  ELLP ORDER  -  THIRD     CLASS II
 SC0916
 SC0916.The horizontal coordinates were established by GPS observations
 SC0916.and adjusted by the National Geodetic Survey in January 1999.
 SC0916
 SC0916.The orthometric height was determined by differential leveling
 SC0916.and adjusted by the National Geodetic Survey in June 1991.
 SC0916
 SC0916.This mark is designated as VM 1083 in the Oceanographic Products
 SC0916.and Services Division Tidal Bench Mark database.
 SC0916
 SC0916.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SC0916
 SC0916.The Laplace correction was computed from DEFLEC96 derived deflections.
 SC0916
 SC0916.The ellipsoidal height was determined by GPS observations
 SC0916.and is referenced to NAD 83.
 SC0916
 SC0916.The geoid height was determined by GEOID96.
 SC0916
 SC0916.The dynamic height is computed by dividing the NAVD 88
 SC0916.geopotential number by the normal gravity value computed on the
 SC0916.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 SC0916.degrees latitude (G = 980.6199 gals.).
 SC0916
 SC0916.The modeled gravity was interpolated from observed gravity values.
 SC0916
 SC0916;                    North         East     Units   Scale      Converg.
 SC0916;SPC WA S     -   158,293.909   234,674.370   MT  0.99991678 -2 31 16.5
 SC0916;UTM  10      - 5,172,834.611   425,780.719   MT  0.99966771 -0 42 24.1
 SC0916
 SC0916                           SUPERSEDED SURVEY CONTROL
 SC0916
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SC0916  NGVD 29     -         3.096  (m)           10.16   (f) ADJ UNCH    1 2
SC0916
SC0916.Superseded values are not recommended for survey control.
SC0916.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SC0916.See file dsdata.txt to determine how the superseded data were derived.
SC0916
SC0916_MARKER: DD = SURVEY DISK
SC0916_SETTING: 35 = FLAG POLE FOUNDATION
SC0916_STAMPING: FLAG 1958
SC0916_PROJECTION: FLUSH
SC0916_MAGNETIC: O = OTHER; SEE DESCRIPTION
SC0916_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SC0916+STABILITY: SURFACE MOTION
SC0916
SC0916  HISTORY     - Date     Condition        Recov. By
SC0916  HISTORY     - 1958     MONUMENTED       DOD
SC0916  HISTORY     - 1968     GOOD             NGS
SC0916  HISTORY     - 19971015 GOOD             WADECO
SC0916
SC0916                          STATION DESCRIPTION
SC0916
SC0916'DESCRIBED BY NATIONAL GEODETIC SURVEY 1968
SC0916'IN TOKELAND.
SC0916'AT TOKELAND, 0.55 MILE SOUTHEAST ALONG AN ASPHALT ROAD FROM THE POST
SC0916'OFFICE, IN R10W T14N, SECTION 18, AT WILLAPA BAY COAST GUARD STATION,
SC0916'IN THE TOP OF THE CONCRETE BASE OF THE FLAGPOLE, 2.8 FEET SOUTHWEST OF
SC0916'THE POLE, 46 FEET NORTH OF THE CENTER LINE OF THE ROAD, AND ABOUT
SC0916'LEVEL WITH THE ROAD.
SC0916
SC0916                          STATION RECOVERY (1997)
SC0916
SC0916'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SC0916'RECOVERED AS DESCRIBED.  TOKELAND USCG STATION HAS BEEN CLOSED AND
SC0916'SOLD TO PRIVATE HOME OWNERS.  FROM THE INTERSECTION OF SR 105 AND
SC0916'TOKELAND ROAD FOLLOW TOKELAND ROAD 2.5 MILES (4.0 KM) SOUTHEAST TO THE
SC0916'OLD USCG STATION AND THE INTERSECTION OF KINDRED AVENUE AND NORTH
SC0916'AVENUE.  THE STATION IS IN THE CEMENT FOUNDATION FOR A FLAG POLE
SC0916'LOCATED IN THE FRONT YARD OF A WHITE SINGLE STORY HOME NORTHEAST OF
SC0916'THE INTERSECTION AND 46 FT (14.0 M) NORTH OF THE CENTERLINE OF
SC0916'TOKELAND ROAD.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AF9545 ***********************************************************************
 AF9545  CORS         -  This is a GPS Continuously Operating Reference Station.
 AF9545  DESIGNATION -  FORT STEVENS 1 CORS ARP
 AF9545  CORS_ID      -  FTS1
 AF9545  PID          -  AF9545
 AF9545  STATE/COUNTY-  OR/CLATSOP
 AF9545  USGS QUAD    -  WARRENTON (1985)
 AF9545
 AF9545                          *CURRENT SURVEY CONTROL
 AF9545  ______________________________________________________________________
 AF9545* NAD 83(CORS)-  46 12 17.57696(N)    123 57 21.88547(W)     ADJUSTED
 AF9545* NAVD 88      -
 AF9545  ______________________________________________________________________
 AF9545  EPOCH DATE   -        1997.00
 AF9545  X            -  -2,469,884.587 (meters)                    COMP
 AF9545  Y            -  -3,667,816.179 (meters)                    COMP
 AF9545  Z            -   4,581,028.113 (meters)                    COMP
 AF9545  ELLIP HEIGHT-         -13.60  (meters)                     GPS OBS
 AF9545  GEOID HEIGHT-         -23.63  (meters)                     GEOID96
 AF9545
 AF9545  HORZ ORDER   -  SPECIAL (CORS)
 AF9545  ELLP ORDER   -  SPECIAL (CORS)
 AF9545
 AF9545.ITRF positions available for this station.
 AF9545.The coordinates were established by GPS observations
 AF9545.and adjusted by the National Geodetic Survey in April 1996.
 AF9545.The coordinates are valid at the epoch date displayed above.
 AF9545.The epoch date for horizontal control is a decimal equivalence
 AF9545.of Year/Month/Day.
 AF9545
 AF9545
 AF9545.The XYZ, and position/ellipsoidal ht. are equivalent.
 AF9545
 AF9545.The ellipsoidal height was determined by GPS observations
 AF9545.and is referenced to NAD 83.
 AF9545
 AF9545.The geoid height was determined by GEOID96.
 AF9545
 AF9545;                     North         East     Units   Scale      Converg.
 AF9545;SPC OR N      -   287,773.285 2,233,336.272   MT  1.00005858 -2 27 03.6
 AF9545
 AF9545                          SUPERSEDED SURVEY CONTROL
 AF9545
 AF9545  NAD 83(CORS)-  46 12 17.57676(N)    123 57 21.88603(W) AD(1996.00) c
 AF9545  ELLIP HT     -         -13.60  (m)                     GP(1996.00) c c
 AF9545
 AF9545.Superseded values are not recommended for survey control.
 AF9545.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
 AF9545.See file dsdata.txt to determine how the superseded data were derived.
 AF9545
 AF9545_STATION IS THE ANTENNA REFERENCE POINT OF THE GPS ANTENNA
 AF9545
 AF9545                          STATION DESCRIPTION
 AF9545
 AF9545'DESCRIBED BY NATIONAL GEODETIC SURVEY 1996
 AF9545'STATION IS A GPS CORS.  LATEST INFORMATION INCLUDING POSITIONS AND
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AF9545'VELOCITIES ARE AVAILABLE IN THE COORDINATE AND LOG FILES ACCESSIBLE
AF9545'BY ANONYMOUS FTP OR THE WORLDWIDE WEB.
AF9545'   FTP CORS.NGS.NOAA.GOV: CORS/COORD  AND  CORS/STATION_LOG
AF9545'   HTTP://WWW.NGS.NOAA.GOV  UNDER PRODUCTS AND SERVICES.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7011 ***********************************************************************
 AH7011  DESIGNATION -  GELF
 AH7011  PID         -  AH7011
 AH7011  STATE/COUNTY-  WA/PACIFIC
 AH7011  USGS QUAD   -  NORTH COVE (1985)
 AH7011
 AH7011                        *CURRENT SURVEY CONTROL
 AH7011  ______________________________________________________________________
 AH7011* NAD 83(1991)-  46 44 47.29643(N)    124 05 36.97123(W)     ADJUSTED
 AH7011* NAVD 88     -         5.74   (meters)      18.8    (feet)  GPS OBS
 AH7011  ______________________________________________________________________
 AH7011  X           -  -2,454,210.121 (meters)                     COMP
 AH7011  Y           -  -3,625,725.092 (meters)                     COMP
 AH7011  Z           -   4,622,483.930 (meters)                     COMP
 AH7011  LAPLACE CORR-          14.89  (seconds)                    DEFLEC96
 AH7011  ELLIP HEIGHT-         -18.70  (meters)                     GPS OBS
 AH7011  GEOID HEIGHT-         -24.29  (meters)                     GEOID96
 AH7011
 AH7011  HORZ ORDER  -  FIRST
 AH7011  ELLP ORDER  -  THIRD     CLASS II
 AH7011
 AH7011.The horizontal coordinates were established by GPS observations
 AH7011.and adjusted by the National Geodetic Survey in January 1999.
 AH7011
 AH7011.The orthometric height was determined by GPS observations and a
 AH7011.high-resolution geoid model using precise GPS observation and
 AH7011.processing techniques.
 AH7011
 AH7011.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7011
 AH7011.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7011
 AH7011.The ellipsoidal height was determined by GPS observations
 AH7011.and is referenced to NAD 83.
 AH7011
 AH7011.The geoid height was determined by GEOID96.
 AH7011
 AH7011;                    North         East     Units   Scale      Converg.
 AH7011;SPC WA S     -   163,324.692   225,512.109   MT  0.99991856 -2 36 37.4
 AH7011;UTM  10      - 5,177,571.666   416,466.030   MT  0.99968577 -0 47 47.6
 AH7011
 AH7011                          SUPERSEDED SURVEY CONTROL
 AH7011
 AH7011.No superseded survey control is available for this station.
 AH7011
 AH7011_MARKER: I = METAL ROD
 AH7011_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 AH7011_STAMPING: GELF 1997
 AH7011_PROJECTION: RECESSED 10 CENTIMETERS
 AH7011_MAGNETIC: I = MARKER IS A STEEL ROD
 AH7011_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
 AH7011_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7011+SATELLITE: SATELLITE OBSERVATIONS - 1997
 AH7011_ROD/PIPE-DEPTH: 10   meters
 AH7011
 AH7011  HISTORY     - Date     Condition        Recov. By
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AH7011 HISTORY   - 1997   MONUMENTED   NGS
AH7011
AH7011   STATION DESCRIPTION
AH7011
AH7011'DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH7011'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) THE
AH7011'STATION IS LOCATED NEAR THE TOWN OF NORTH COVE, WA AND IS 5.7 MILES
AH7011'(9.2 KM) SOUTH OF GRAYLAND. FROM THE INTERSECTION OF SR 105 AND
AH7011'CRANBERRY LANE/GRAYLAND BEACH ROAD IN GRAYLAND GO SOUTH ON SR 105 5.7
AH7011'MILES (9.2 KM) TO WARRENTON CANNERY ROAD. TURN WEST AND FOLLOW
AH7011'WARRENTON CANNERY ROAD TO THE BEACH ACCESS PARKING AND WOOD FRAME
AH7011'RESTROOMS ON THE NORTH SIDE OF ROAD. THE STATION IS 100 M (328.1 FT)
AH7011'WEST OF THE NORTHWEST CORNER OF THE RESTROOMS, 8.2 M (26.9 FT) NORTH
AH7011'OF THE CENTERLINE OF WARRENTON CANNERY ROAD, AND 1 M (3.3 FT) SOURTH
AH7011'OF A ORANGE NGS WITNESS POST, OR 65 M (213.3 FT) (43 DEGREES GRID)
AH7011'FROM A LONE TELEPHONE POLE WITH A RED 8 X 8 FT (2.4 M) COE
AH7011'HYDROGRAPHIC SIGNAL. THE STATION IS A STAINLESS STEEL ROD DRIVEN 74
AH7011'FT. (22.6 M) ACCESS TO THE DATUM IS HAD THROUGH A 5-INCH STANDARD NGS
AH7011'LOGO CAP THAT IS STAMPED GELF 1997.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH6996 ***********************************************************************
 AH6996  DESIGNATION -  GKAM
 AH6996  PID         -  AH6996
 AH6996  STATE/COUNTY-  WA/GRAYS HARBOR
 AH6996  USGS QUAD   -  MOCLIPS (1985)
 AH6996
 AH6996                         *CURRENT SURVEY CONTROL
 AH6996  ______________________________________________________________________
 AH6996* NAD 83(1991)-  47 12 25.56964(N)    124 12 13.44881(W)     ADJUSTED
 AH6996* NAVD 88     -         7.16   (meters)      23.5    (feet)  GPS OBS
 AH6996  ______________________________________________________________________
 AH6996  X           -  -2,440,130.545 (meters)                     COMP
 AH6996  Y           -  -3,590,039.528 (meters)                     COMP
 AH6996  Z           -   4,657,424.092 (meters)                     COMP
 AH6996  LAPLACE CORR-           8.51  (seconds)                    DEFLEC96
 AH6996  ELLIP HEIGHT-         -17.30  (meters)                     GPS OBS
 AH6996  GEOID HEIGHT-         -24.27  (meters)                     GEOID96
 AH6996
 AH6996  HORZ ORDER  -  FIRST
 AH6996  ELLP ORDER  -  THIRD     CLASS II
 AH6996
 AH6996.The horizontal coordinates were established by GPS observations
 AH6996.and adjusted by the National Geodetic Survey in January 1999.
 AH6996
 AH6996.The orthometric height was determined by GPS observations and a
 AH6996.high-resolution geoid model using precise GPS observation and
 AH6996.processing techniques.
 AH6996
 AH6996.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH6996
 AH6996.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH6996
 AH6996.The ellipsoidal height was determined by GPS observations
 AH6996.and is referenced to NAD 83.
 AH6996
 AH6996.The geoid height was determined by GEOID96.
 AH6996
 AH6996;                    North         East     Units   Scale      Converg.
 AH6996;SPC WA S     -   214,862.915   219,509.530   MT  0.99997357 -2 41 25.4
 AH6996;UTM  10      - 5,228,881.846   408,840.024   MT  0.99970213 -0 53 00.2
 AH6996
 AH6996                           SUPERSEDED SURVEY CONTROL
 AH6996
 AH6996.No superseded survey control is available for this station.
 AH6996
 AH6996_MARKER: I = METAL ROD
 AH6996_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 AH6996_STAMPING: GKAM 1997
 AH6996_PROJECTION: RECESSED 10 CENTIMETERS
 AH6996_MAGNETIC: I = MARKER IS A STEEL ROD
 AH6996_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
 AH6996+STABILITY: POSITION/ELEVATION WELL
 AH6996_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH6996+SATELLITE: SATELLITE OBSERVATIONS - 1997
 AH6996_ROD/PIPE-DEPTH: 10   meters
 AH6996
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AH6996  HISTORY     - Date     Condition        Recov. By
AH6996  HISTORY     - 1997     MONUMENTED       NGS
AH6996
AH6996                          STATION DESCRIPTION
AH6996
AH6996'DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH6996'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) .  THE
AH6996'STATION IS LOCATED IN PACIFIC BEACH STATE PARK IN THE CITY OF PACIFIC
AH6996'BEACH.  FROM THE INTERSECTION OF SR 109 AND OCEAN BEACH ROAD GO WEST
AH6996'ON MAIN STREET (OCEAN BEACH ROAD) TO SECOND STREET.  TURN SOUTH AND
AH6996'PROCEED TO THE ENTRANCE TO PACIFIC BEACH STATE PARK. FROM THE ENTRANCE
AH6996'OF PACIFIC BEACH STATE PARK TURN WEST TOWARD BEACH AND FOLLOW ROAD
AH6996'PAST CEMENT BLOCK BATHROOMS TO A T INTERSECTION. TURN RIGHT AND
AH6996'PROCEED TO THE DAY USE PARKING AREA AND A VEHICLE TURN AROUND WITH
AH6996'TRAFFIC ISLAND.  THE STATION IS AT THE CENTER OF THE TRAFFIC ISLAND
AH6996'AND IS LOCATED 0.5 M (1.6 FT) EAST OF A ORANGE NGS WITNESS POST, OR 68
AH6996'M (223.1 FT) WEST (280 DEGREES GRID) OF THE INTERSECTION OF CENTRAL
AH6996'AVENUE AND FIRST STREET IN THE CITY OF PACIFIC BEACH.  THE STATION IS
AH6996'A STAINLESS STEEL ROD DRIVEN 33 FT. (10.1 M) ACCESS TO THE DATUM POINT
AH6996'IS HAD THROUGH A 5-INCH STANDARD NGS LOGO CAP THAT IS STAMPED GKAM
AH6996'1997.  THIS STATION WAS CONVENTIONALLY TIED TO STATION A 443 1977
AH6996'USING SECOND ORDER METHODS. LEVELS HAVE BEEN RUN TO THIS POINT.  THE
AH6996'STATION IS 5.225 M (17.142 FT) LOWER, 450.7 M (1478.7 FT) WEST, AND
AH6996'309.8 M (1016.4 FT) SOUTH OF A 443 (SD0121) .  THE LEVELED NAVD88
AH6996'ELEVATION OF GKAM IS 7.173 M, (23.533 FT) OR 5.225 M (17.142 FT) LOWER
AH6996'THAN A 443 (SD0121) .
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7018 ***********************************************************************
 AH7018  DESIGNATION -  GOULTER 3
 AH7018  PID         -  AH7018
 AH7018  STATE/COUNTY-  WA/PACIFIC
 AH7018  USGS QUAD   -  OYSTERVILLE (1985)
 AH7018
 AH7018                        *CURRENT SURVEY CONTROL
 AH7018  ______________________________________________________________________
 AH7018* NAD 83(1991)-  46 33 08.12145(N)    124 01 30.84202(W)     ADJUSTED
 AH7018* NAVD 88     -         4.63   (meters)      15.2    (feet)  GPS OBS
 AH7018  ______________________________________________________________________
 AH7018  X           -  -2,458,666.266 (meters)                     COMP
 AH7018  Y           -  -3,641,662.015 (meters)                     COMP
 AH7018  Z           -   4,607,662.878 (meters)                     COMP
 AH7018  LAPLACE CORR-          15.96  (seconds)                    DEFLEC96
 AH7018  ELLIP HEIGHT-         -19.49  (meters)                     GPS OBS
 AH7018  GEOID HEIGHT-         -23.97  (meters)                     GEOID96
 AH7018
 AH7018  HORZ ORDER  -  FIRST
 AH7018  ELLP ORDER  -  THIRD     CLASS II
 AH7018
 AH7018.The horizontal coordinates were established by GPS observations
 AH7018.and adjusted by the National Geodetic Survey in January 1999.
 AH7018
 AH7018.The orthometric height was determined by GPS observations and a
 AH7018.high-resolution geoid model using precise GPS observation and
 AH7018.processing techniques.
 AH7018
 AH7018.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7018
 AH7018.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7018
 AH7018.The ellipsoidal height was determined by GPS observations
 AH7018.and is referenced to NAD 83.
 AH7018
 AH7018.The geoid height was determined by GEOID96.
 AH7018
 AH7018;                    North         East     Units   Scale      Converg.
 AH7018;SPC WA S     -   141,522.662   229,766.295   MT  0.99991476 -2 33 38.6
 AH7018;UTM  10      - 5,155,920.413   421,407.488   MT  0.99967592 -0 44 39.7
 AH7018
 AH7018                           SUPERSEDED SURVEY CONTROL
 AH7018
 AH7018.No superseded survey control is available for this station.
 AH7018
 AH7018_MARKER: DR = REFERENCE MARK DISK
 AH7018_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 AH7018_STAMPING: GOULTER 3 NO. 1 1987
 AH7018_PROJECTION: FLUSH
 AH7018_MAGNETIC: S = STEEL SPIKE IMBEDDED IN MONUMENT
 AH7018_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AH7018+STABILITY: SURFACE MOTION
 AH7018_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7018+SATELLITE: SATELLITE OBSERVATIONS - 1939
 AH7018
 AH7018  HISTORY     - Date     Condition        Recov. By
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AH7018 HISTORY   - 1939   MONUMENTED   CGS
AH7018
AH7018   STATION DESCRIPTION
AH7018
AH7018'DESCRIBED BY COAST AND GEODETIC SURVEY 1939 (WMS)
AH7018'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) . THIS
AH7018'STATION REPLACES GOULTER 2 1938 (SD0515) WHICH HAS BEEN DESTROYED.
AH7018'REFERENCE MARK 1 (GOULTER 2 NO. 1 1938) HAS BEEN RESTAMPED GOULTER 3
AH7018'NO. 1 1987 AND REMONUMENTED IN A ROUND CONCRETE FORM AS THE CAST-IRON
AH7018'SOIL PIPE WAS BADLY RUSTED. THE STATION IS ON THE WEST SHORE OF
AH7018'WILLAPA BAY, ABOUT 278 M (912.1 FT) NORTH OF BRADYS OYSTER HOUSE IN
AH7018'THE TOWN OF OYSTERVILLE. THE STATION IS 5 M (16.4 FT) WEST OF THE TOP
AH7018'OF A ROCK REVETMENT ON THE SHORELINE OF WILLAPA BAY. FROM THE
AH7018'INTERSECTION OF OYSTERVILLE ROAD AND PENINSULA HWY PROCEED EAST ON
AH7018'OYSTERVILLE ROAD TO PACIFIC STREET. TURN NORTH AND PROCEED TO BRADYS
AH7018'OYSTER HOUSE AND THE INTERSECTION OF CLARK STREET AND PACIFIC STREET.
AH7018'FROM THE INTERSECTION PROCEED ABOUT 240 M (787.4 FT) NORTH ALONG
AH7018'SHORELINE BELOW ROCK REVETMENT (GRAVEL ROAD MAY BE DRIVEN TO WITHIN 40
AH7018'M (131.2 FT) OF MARK ON ALL BUT HIGH TIDE) . CONTINUE NORTH ABOUT 40
AH7018'M. (131.2 FT) THE STATION IS ABOUT 20 M (65.6 FT) WEST OF THE STORM
AH7018'HIGH WATER LINE, 5 M (16.4 FT) WEST OF THE TOP OF THE ROCK REVETMENT,
AH7018'1 M (3.3 FT) EAST OF A THORN THICKET, AND 0.25 M (0.82 FT) EAST OF A
AH7018'ORANGE NGS WITNESS POST PROJECTING 2 FT (0.6 M) (DAMAGED) . THE
AH7018'STATION IS A STANDARD CGS REFERENCE MARK DISK STAMPED GOULTER 3 NO. 1
AH7018'1987 ATTACHED TO A 30 INCH BY 4 INCH CAST-IRON SOIL PIPE WITHIN A
AH7018'ROUND CONCRETE MONUMENT THAT PROJECTS 6-INCHES ABOVE THE SURFACE.
AH7018'REFERENCE MARK 2 IS ABOUT 38 M (124.7 FT) SOUTH OF THE STATION, 13 M
AH7018'(42.7 FT) WEST OF THE ROCK REVETMENT, AND ON THE WEST SIDE OF THE
AH7018'THORN THICKET AND THE EAST SIDE OF A OLD FARM FIELD. THE MARK IS NEAR
AH7018'TWO LARGE HALF-BURIED DRIFT LOGS AND UNDER THE BRANCHES OF A 10 FT
AH7018'(3.0 M) TALL DECIDUOUS TREE. THE REFERENCE MARK IS A STANDARD DISK
AH7018'STAMPED GOULTER 3 NO. 2 1938 ATTACHED TO A 30 INCH BY 4 INCH
AH7018'CAST-IRON SOIL PIPE WITHIN A ROUND CONCRETE MONUMENT THAT PROJECTS
AH7018'ABOUT 3-INCHES ABOVE THE SURFACE. A ORANGE NGS WITNESS POST IS 1 M
AH7018'(3.3 FT) FROM THE MARK.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH6998 ***********************************************************************
 AH6998  DESIGNATION -  GP 14109 31
 AH6998  PID         -  AH6998
 AH6998  STATE/COUNTY-  WA/GRAYS HARBOR
 AH6998  USGS QUAD   -  COPALIS BEACH (1984)
 AH6998
 AH6998                         *CURRENT SURVEY CONTROL
 AH6998  ______________________________________________________________________
 AH6998* NAD 83(1991)-  47 06 51.59481(N)    124 10 41.52054(W)     ADJUSTED
 AH6998* NAVD 88     -         7.33   (meters)      24.0    (feet)  GPS OBS
 AH6998  ______________________________________________________________________
 AH6998  X           -  -2,442,778.753 (meters)                     COMP
 AH6998  Y           -  -3,597,383.233 (meters)                     COMP
 AH6998  Z           -   4,650,411.389 (meters)                     COMP
 AH6998  LAPLACE CORR-           8.69  (seconds)                    DEFLEC96
 AH6998  ELLIP HEIGHT-         -17.28  (meters)                     GPS OBS
 AH6998  GEOID HEIGHT-         -24.44  (meters)                     GEOID96
 AH6998
 AH6998  HORZ ORDER  -  FIRST
 AH6998  ELLP ORDER  -  THIRD     CLASS II
 AH6998
 AH6998.The horizontal coordinates were established by GPS observations
 AH6998.and adjusted by the National Geodetic Survey in January 1999.
 AH6998
 AH6998.The orthometric height was determined by GPS observations and a
 AH6998.high-resolution geoid model using precise GPS observation and
 AH6998.processing techniques.
 AH6998
 AH6998.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH6998
 AH6998.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH6998
 AH6998.The ellipsoidal height was determined by GPS observations
 AH6998.and is referenced to NAD 83.
 AH6998
 AH6998.The geoid height was determined by GEOID96.
 AH6998
 AH6998;                    North         East     Units   Scale      Converg.
 AH6998;SPC WA S     -   204,470.295   220,961.222   MT  0.99995726 -2 40 18.6
 AH6998;UTM  10      - 5,218,542.934   410,618.367   MT  0.99969819 -0 51 48.0
 AH6998
 AH6998                           SUPERSEDED SURVEY CONTROL
 AH6998
 AH6998.No superseded survey control is available for this station.
 AH6998
 AH6998_MARKER: DB = BENCH MARK DISK
 AH6998_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 AH6998_STAMPING: GP14109-31
 AH6998_PROJECTION: FLUSH
 AH6998_MAGNETIC: O = OTHER; SEE DESCRIPTION
 AH6998_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AH6998+STABILITY: SURFACE MOTION
 AH6998_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH6998+SATELLITE: SATELLITE OBSERVATIONS - 1993
 AH6998
 AH6998  HISTORY     - Date     Condition        Recov. By
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AH6998 HISTORY   - 1993   MONUMENTED   WADT
AH6998
AH6998   STATION DESCRIPTION
AH6998
AH6998'DESCRIBED BY WA DEPT OF TRANSP 1993
AH6998'DESCRIBED BY THE WASHINGTON STATE DAPARTMENT OF ECOLOGY (RCD) FROM THE
AH6998'INTERSECTION OF SR 109 AND BENNER ROAD IN THE CITY OF COPALIS BEACH GO
AH6998'0.25 MILES (0.40 KM) WEST ON BENNER ROAD TO GRIFFITH-PRIDAY STATE PARK
AH6998'AND THE BEACH ACCESS PARKING AREA ON RIGHT. THERE IS A CONCRETE BLOCK
AH6998'BATHROOM ON THE NORTH SIDE OF PARKING AREA. THE STATION IS 15 M (49.2
AH6998'FT) NORTH OF THE CENTERLINE OF BENNER ROAD, 4.8 M (15.7 FT) EAST OF
AH6998'THE WEST END OF A CONCRETE CURB (OF A TRAFFIC ISLAND) , AND 1.5 M (4.9
AH6998'FT) SOUTHWEST OF A WHITE WITNESS POST. THE STATION IS A BRASS
AH6998'WASHINGTON STATE DEPARTMENT OF TRANSPORTATION DISK SET INTO A ROUND
AH6998'CONCRETE MONUMENT PROJECTING 10 CM ABOUT THE GROUND. THE DISK IS
AH6998'STAMPED GP14109-31 1983.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7013 ***********************************************************************
 AH7013  DESIGNATION -  GP 25105 13
 AH7013  PID         -  AH7013
 AH7013  STATE/COUNTY-  WA/PACIFIC
 AH7013  USGS QUAD   -  NORTH COVE (1985)
 AH7013
 AH7013                        *CURRENT SURVEY CONTROL
 AH7013  ______________________________________________________________________
 AH7013* NAD 83(1991)-  46 43 42.41416(N)    124 02 17.35091(W)     ADJUSTED
 AH7013* NAVD 88     -         4.33   (meters)      14.2    (feet)  GPS OBS
 AH7013  ______________________________________________________________________
 AH7013  X           -  -2,451,516.286 (meters)                     COMP
 AH7013  Y           -  -3,629,306.938 (meters)                     COMP
 AH7013  Z           -   4,621,110.023 (meters)                     COMP
 AH7013  LAPLACE CORR-          15.19  (seconds)                    DEFLEC96
 AH7013  ELLIP HEIGHT-         -19.81  (meters)                     GPS OBS
 AH7013  GEOID HEIGHT-         -24.00  (meters)                     GEOID96
 AH7013
 AH7013  HORZ ORDER  -  FIRST
 AH7013  ELLP ORDER  -  THIRD     CLASS II
 AH7013
 AH7013.The horizontal coordinates were established by GPS observations
 AH7013.and adjusted by the National Geodetic Survey in January 1999.
 AH7013
 AH7013.The orthometric height was determined by GPS observations and a
 AH7013.high-resolution geoid model using precise GPS observation and
 AH7013.processing techniques.
 AH7013
 AH7013.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7013
 AH7013.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7013
 AH7013.The ellipsoidal height was determined by GPS observations
 AH7013.and is referenced to NAD 83.
 AH7013
 AH7013.The geoid height was determined by GEOID96.
 AH7013
 AH7013;                    North         East     Units   Scale      Converg.
 AH7013;SPC WA S     -   161,131.872   229,654.821   MT  0.99991772 -2 34 12.4
 AH7013;UTM  10      - 5,175,511.570   420,675.083   MT  0.99967734 -0 45 21.4
 AH7013
 AH7013                          SUPERSEDED SURVEY CONTROL
 AH7013
 AH7013.No superseded survey control is available for this station.
 AH7013
 AH7013_MARKER: DD = SURVEY DISK
 AH7013_SETTING: 2 = OBJECT DRIVEN INTO GROUND
 AH7013_STAMPING: GP26105-31 1995
 AH7013_PROJECTION: FLUSH
 AH7013_MAGNETIC: O = OTHER; SEE DESCRIPTION
 AH7013_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AH7013+STABILITY: SURFACE MOTION
 AH7013_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7013+SATELLITE: SATELLITE OBSERVATIONS - 1995
 AH7013
 AH7013  HISTORY     - Date     Condition        Recov. By
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AH7013  HISTORY     - 1995     MONUMENTED       WADT
AH7013
AH7013                          STATION DESCRIPTION
AH7013
AH7013'DESCRIBED BY WA DEPT OF TRANSP 1995
AH7013'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .
AH7013'THE STATION IS SOUTHEAST OF NORTH COVE AND NORTHWEST OF TOKELAND. FROM
AH7013'SR 105 AND TOKELAND ROAD GO WEST 0.9 MILES (1.4 KM) TO STATION ON
AH7013'RIGHT.  THE STATION IS 6.5 M (21.3 FT) NORTHWEST OF THE CENTERLINE OF
AH7013'SR 105, 38.8 M (127.3 FT) SOUTHEAST OF A DOUBLE POWER POLE WITH THREE
AH7013'LARGE TRANSFORMERS, 25.2 M (82.7 FT) SOUTHEAST OF POWER POLE P829, AND
AH7013'1.1 M (3.6 FT) SOUTHEAST OF A DOT WHITE WITNESS POST.  THE STATION IS
AH7013'A BRASS WS DOT SURVEY DISK LOCATED UNDER A DOT CAST IRON MONUMENT AND
AH7013'COVER.  THE STATION IS ABOUT 10 CM LOWER THAN THE GRAVEL SURFACE OF
AH7013'THE ROAD SHOULDER.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SC2756 ***********************************************************************
 SC2756  CBN         -  This is a Cooperative Base Network Control Station.
 SC2756  DESIGNATION -  GP 35004 3
 SC2756  PID         -  SC2756
 SC2756  STATE/COUNTY-  WA/WAHKIAKUM
 SC2756  USGS QUAD   -  ROSBURG (1985)
 SC2756
 SC2756                        *CURRENT SURVEY CONTROL
 SC2756  ______________________________________________________________________
 SC2756* NAD 83(1991)-  46 20 02.16844(N)    123 38 56.57971(W)     ADJUSTED
 SC2756* NAVD 88     -        27.89   (meters)      91.5    (feet)  GPS OBS
 SC2756  ______________________________________________________________________
 SC2756  X           -  -2,444,458.254 (meters)                     COMP
 SC2756  Y           -  -3,672,380.894 (meters)                     COMP
 SC2756  Z           -   4,590,958.324 (meters)                     COMP
 SC2756  LAPLACE CORR-          13.44  (seconds)                    DEFLEC96
 SC2756  ELLIP HEIGHT-           5.64  (meters)                     GPS OBS
 SC2756  GEOID HEIGHT-         -22.10  (meters)                     GEOID96
 SC2756
 SC2756  HORZ ORDER  -  B
 SC2756  ELLP ORDER  -  THIRD     CLASS II
 SC2756
 SC2756.The horizontal coordinates were established by GPS observations
 SC2756.and adjusted by the National Geodetic Survey in May 1991.
 SC2756
 SC2756.The orthometric height was determined by GPS observations and a
 SC2756.high-resolution geoid model using precise GPS observation and
 SC2756.processing techniques.
 SC2756
 SC2756.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SC2756
 SC2756.The Laplace correction was computed from DEFLEC96 derived deflections.
 SC2756
 SC2756.The ellipsoidal height was determined by GPS observations
 SC2756.and is referenced to NAD 83.
 SC2756
 SC2756.The geoid height was determined by GEOID96.
 SC2756
 SC2756;                    North         East     Units   Scale      Converg.
 SC2756;SPC WA S     -   116,055.416   257,618.625   MT  0.99992416 -2 17 14.8
 SC2756;UTM  10      - 5,131,355.802   450,045.807   MT  0.99963067 -0 28 10.3
 SC2756
 SC2756                          SUPERSEDED SURVEY CONTROL
 SC2756
 SC2756  ELLIP HT    -           5.69  (m)                      GP(       ) 4 1
 SC2756  NAD 83(1986)-  46 20 02.17411(N)    123 38 56.55214(W) AD(       ) 2
 SC2756  NGVD 29     -        26.6    (m)           87.     (f) GPS OBS
 SC2756
 SC2756.Superseded values are not recommended for survey control.
 SC2756.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
 SC2756.See file dsdata.txt to determine how the superseded data were derived.
 SC2756
 SC2756_MARKER: DH = HORIZONTAL CONTROL DISK
 SC2756_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 SC2756_STAMPING: GP 35004-3 1986
 SC2756_PROJECTION: FLUSH
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SC2756_MAGNETIC: O = OTHER; SEE DESCRIPTION
SC2756_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SC2756+STABILITY: SURFACE MOTION
SC2756_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SC2756+SATELLITE: SATELLITE OBSERVATIONS - February 07, 1991
SC2756
SC2756  HISTORY     - Date     Condition        Recov. By
SC2756  HISTORY     - 1986     MONUMENTED       NGS
SC2756  HISTORY     - 1986     GOOD             NGS
SC2756  HISTORY     - 19870519 GOOD
SC2756  HISTORY     - 19890727 GOOD             NGS
SC2756  HISTORY     - 19910207 GOOD
SC2756  HISTORY     - 19970724 GOOD             WADECO
SC2756
SC2756                          STATION DESCRIPTION
SC2756
SC2756'DESCRIBED BY NATIONAL GEODETIC SURVEY 1986 (DAW)
SC2756'THE STATION IS LOCATED ABOUT 16.1 KM (10 MI) NORTHWEST OF
SC2756'SKAMOKAWA, 12.9 KM (8 MI) SOUTHEAST OF NASELLE, 8.1 KM (5 MI) NORTH
SC2756'OF ALTOONA AND ON HIGHWAY RIGHT-OF-WAY.
SC2756'
SC2756'TO REACH THE STATION FROM THE POST OFFICE IN ROSBURG GO WESTERLY ON
SC2756'STATE HIGHWAY 4 FOR 0.72 KM (0.45   ) TO A DRIVEWAY ON THE LEFT AND
SC2756'THE STATION.
SC2756'
SC2756'THE STATION MARK IS A STANDARD NGS DISK STAMPED---GP35 004-3 1986---
SC2756'SET IN THE TOP OF A ROUND CONCRETE MONUMENT THAT IS 30 CM
SC2756'(12 INCHES) IN DIAMETER AND IS FLUSH WITH THE GROUND SURFACE.  IT IS
SC2756'17.1 M (56 FT) WEST OF A FIRE HYDRANDT, 5.8 M (19 FT) SOUTH OF THE
SC2756'CENTER OF THE HIGHWAY, 4.3 M (14 FT) NORTHWEST OF AN APPLE TREE AND
SC2756'7.1 M (23.4 FT) EAST OF A WITNESS POST.
SC2756'
SC2756'THIS STATION IS SUITEABLE FOR GPS OBSERVATIONS.
SC2756'
SC2756'DESCRIBED BY DA WEGENAST.
SC2756
SC2756                          STATION RECOVERY (1986)
SC2756
SC2756'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1986
SC2756'RECOVERED IN GOOD CONDITION.
SC2756
SC2756                          STATION RECOVERY (1987)
SC2756
SC2756'RECOVERED 1987
SC2756'RECOVERED IN GOOD CONDITION.
SC2756
SC2756                          STATION RECOVERY (1989)
SC2756
SC2756'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1989
SC2756'THE STATION IS LOCATED ABOUT 16.0 KM (9.9 MI) NORTHWEST OF SKAMOKAWA,
SC2756'12.9 KM (8.0 MI) SOUTHEAST OF NASELLE, 8.1 KM (5.0 MI) NORTH OF
SC2756'ALTOONA AND ON HIGHWAY RIGHT-OF-WAY.
SC2756'TO REACH FROM THE POST OFFICE IN ROSBURG, GO WEST ON STATE ROUTE 4 FOR
SC2756'0.72 KM (0.45 MI) TO THE TOP OF THE HILL, A DRIVEWAY ON THE LEFT AND
SC2756'THE STATION.
SC2756'THE MARK IS SET IN THE TOP OF A ROUND CONCRETE MONUMENT THAT IS FLUSH
SC2756'WITH THE GROUND SURFACE.  IT IS 17.1 M (56.1 FT) WEST OF A FIRE
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SC2756'HYDRANT, 5.8 M (19.0 FT) SOUTH OF THE CENTER OF STATE ROUTE 4, 4.3 M
SC2756'(14.1 FT) NORTHWEST OF AN APPLE TREE AND 7.1 M (23.3 FT) EAST OF A
SC2756'WITNESS POST.
SC2756
SC2756 STATION RECOVERY (1991)
SC2756
SC2756'RECOVERED 1991
SC2756'RECOVERED IN GOOD CONDITION.
SC2756
SC2756 STATION RECOVERY (1997)
SC2756
SC2756'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SC2756'RECOVERED AS DESCRIBED. THE STATION IS 14.7 MILES (23.7 KM) EAST ON
SC2756'SR 4 FROM INTERSECTION OF U.S. 101 AND SR 4. STATION IS ON SOUTH
SC2756'SIDE OF ROAD, ACROSS FROM LARGE GRAVEL TURNOUT.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0394 ***********************************************************************
 SD0394  FBN         -  This is a Candidate for Federal Base Network Control.
 SD0394  DESIGNATION -  GRAYS HARBOR E BASE 2
 SD0394  PID         -  SD0394
 SD0394  STATE/COUNTY-  WA/GRAYS HARBOR
 SD0394  USGS QUAD   -  WESTPORT (1984)
 SD0394
 SD0394                         *CURRENT SURVEY CONTROL
 SD0394  ______________________________________________________________________
 SD0394* NAD 83(1991)-  46 54 10.09754(N)    124 05 59.00899(W)     ADJUSTED
 SD0394* NAVD 88     -         5.06   (meters)      16.6    (feet)  GPS OBS
 SD0394  ______________________________________________________________________
 SD0394  X           -  -2,447,491.734 (meters)                     COMP
 SD0394  Y           -  -3,614,967.597 (meters)                     COMP
 SD0394  Z           -   4,634,374.793 (meters)                     COMP
 SD0394  LAPLACE CORR-          13.06  (seconds)                    DEFLEC96
 SD0394  ELLIP HEIGHT-         -19.43  (meters)                     GPS OBS
 SD0394  GEOID HEIGHT-         -24.33  (meters)                     GEOID96
 SD0394
 SD0394  HORZ ORDER  -  A
 SD0394  ELLP ORDER  -  THIRD     CLASS II
 SD0394
 SD0394.The horizontal coordinates were established by GPS observations
 SD0394.and adjusted by the National Geodetic Survey in January 1999.
 SD0394
 SD0394.The orthometric height was determined by GPS observations and a
 SD0394.high-resolution geoid model using precise GPS observation and
 SD0394.processing techniques.
 SD0394
 SD0394.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0394
 SD0394.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0394
 SD0394.The ellipsoidal height was determined by GPS observations
 SD0394.and is referenced to NAD 83.
 SD0394
 SD0394.The geoid height was determined by GEOID96.
 SD0394
 SD0394;                    North         East     Units   Scale      Converg.
 SD0394;SPC WA S     -   180,705.800   225,837.656   MT  0.99992995 -2 36 53.4
 SD0394;UTM  10      - 5,194,950.242   416,241.632   MT  0.99968622 -0 48 11.0
 SD0394
 SD0394:                Primary Azimuth Mark                    Grid Az
 SD0394:SPC WA S     -  OCOSTA WHITE HOUSE CUPOLA               106 06 35.5
 SD0394:UTM  10      -  OCOSTA WHITE HOUSE CUPOLA               104 17 53.1
 SD0394
 SD0394|-----------------------------------------------------------------------|
 SD0394| PID    Reference Object                     Distance      Geod. Az   |
 SD0394|                                                           dddmmss.s  |
 SD0394| SD0010 BAYVIEW                                            03014      |
 SD0394| SC2669 GRAYS HARBOR RANGE 4 REAR LT       APPROX. 9.8 KM  0524919.9  |
 SD0394| SC2671 GRAYS HARBOR RANGE 4 FRONT LT      APPROX.10.3 KM  0534541.1  |
 SD0394| SC2675 GRAYS HARBOR RANGE 3 REAR LT       APPROX.11.9 KM  0540819.8  |
 SD0394| SC2679 GRAYS HARBOR RANGE 3 FRONT LT      APPROX.11.5 KM  0543434.9  |
 SD0394| SC2706 TIDE USE                           APPROX.11.5 KM  0544611.8  |
 SD0394| SD0397 WESTPORT                                           06811      |
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SD0394| SD0390 OCOSTA WHITE HOUSE CUPOLA          APPROX. 5.4 KM 1032942.1 |
SD0394| SD0456 WESTPORT STANDPIPE                 APPROX. 3.6 KM 1841220.0 |
SD0394|        GRAYS HARBOR E BASE 2 RM 1          20.406 METERS 18525     |
SD0394| SD0413 WESTPORT MUNICIPAL TANK            APPROX. 1.1 KM 2110322.0 |
SD0394| SD0423 GRAYS HARBOR LIGHTHOUSE 1909       APPROX. 2.1 KM 2185602.1 |
SD0394| SD0419 NORTH JETTY                                       25046     |
SD0394| SD0427 GRAYS HARBOR CG STA CUPOLA         APPROX. 1.1 KM 3001155.8 |
SD0394| SC2674 BRACK RESET                                       31049     |
SD0394| SD0477 OCEAN SHORES GRAYS HBR NO 3 TK     APPROX. 9.9 KM 3353330.3 |
SD0394| SD0476 OCEAN SHORES RAD STA KDUX MAST     APPROX. 6.3 KM 3375358.3 |
SD0394| SC0772 STEARNS 2                                         34301     |
SD0394| SD0882 GRAYS HARBOR E BASE 2 RM 2           7.145 METERS 34441     |
SD0394| SD0384 MARKHAM                                           35022     |
SD0394|-----------------------------------------------------------------------|
SD0394
SD0394                          SUPERSEDED SURVEY CONTROL
SD0394
SD0394  NAD 83(1991)-  46 54 10.09598(N)    124 05 59.00964(W) AD(       ) B
SD0394  ELLIP HT    -         -19.32  (m)                      GP(       ) 4 1
SD0394  NAD 83(1986)-  46 54 10.08797(N)    124 05 59.00729(W) AD(       ) 2
SD0394  NAD 27      -  46 54 10.76000(N)    124 05 54.39000(W) AD(       ) 2
SD0394  NGVD 29     -         3.96   (m)           13.0    (f) LEVELING    3
SD0394
SD0394.Superseded values are not recommended for survey control.
SD0394.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0394.See file dsdata.txt to determine how the superseded data were derived.
SD0394
SD0394_MARKER: DR = REFERENCE MARK DISK
SD0394_SETTING: 4 = CONCRETE POST
SD0394_STAMPING: EAST BASE 2 1940
SD0394_PROJECTION: FLUSH
SD0394_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0394_STABILITY: D = MARK OF QUESTIONABLE OR UNKNOWN STABILITY
SD0394_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SD0394+SATELLITE: SATELLITE OBSERVATIONS - February 08, 1991
SD0394
SD0394  HISTORY     - Date     Condition        Recov. By
SD0394  HISTORY     - 1940     MONUMENTED       CGS
SD0394  HISTORY     - 1940     GOOD             CGS
SD0394  HISTORY     - 1951     GOOD             CGS
SD0394  HISTORY     - 1969     GOOD             CGS
SD0394  HISTORY     - 1973     GOOD             NGS
SD0394  HISTORY     - 1985     GOOD             NOS
SD0394  HISTORY     - 19891204 GOOD             NGS
SD0394  HISTORY     - 19900105 GOOD             MGSINC
SD0394  HISTORY     - 19910208 GOOD
SD0394  HISTORY     - 19970720 GOOD             WADECO
SD0394
SD0394                          STATION DESCRIPTION
SD0394
SD0394'DESCRIBED BY COAST AND GEODETIC SURVEY 1940 (GLB)
SD0394'STATION IS LOCATED ON A SMALL FLAT SAND DUNE SURROUNDED BY WATER
SD0394'AT HIGH TIDE, ON THE W SIDE OF CHEHALIS POINT, AND 100 METERS S
SD0394'OF THE PIER USED BY THE COLUMBIA CONSTRUCTION COMPANY.
SD0394'
SD0394'STATION MARK IS A STANDARD REFERENCE DISK SET IN THE TOP OF A
SD0394'6-INCH DIAMETER CONCRETE TILE FILLED WITH CONCRETE, 30 INCHES DEEP
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SD0394'AND FLUSH WITH THE GROUND. THIS REFERENCE MARK DISK WAS TO BE
SD0394'USED FOR EAST BASE BUT AS EAST BASE WASHED OUT BEFORE THE
SD0394'CONNECTION WAS MADE, A STANDARD TRIANGULATION DISK STAMPED EAST
SD0394'BASE 2, 1940 WAS CENTERED OVER THE REFERENCE MARK IN A MASS OF
SD0394'CONCRETE 10 INCHES SQUARE AND 6 INCHES DEEP PLACED OVER AND
SD0394'AROUND THE REFERENCE MARK.
SD0394'
SD0394'REFERENCE MARK NO.1 IS A STANDARD BRONZE DISK STAMPED EAST
SD0394'BASE 2, 1940, NO.1 IN THE TOP OF A 6-INCH DIAMETER CONCRETE TILE
SD0394'FILLED WITH CONCRETE, 30 INCHES DEEP AND SET FLUSH WITH THE GROUND
SD0394'SURFACE.
SD0394'
SD0394'FROM THE JUNCTION OF U.S. HIGHWAY 101, AND STATE HIGHWAY 13A
SD0394'IN SOUTH ABERDEEN, FOLLOW STATE HIGHWAY 13A FOR 22.2 MILES, PASSING
SD0394'THROUGH THE TOWN OF WESTPORT 0.7 MILE BEFORE ARRIVING AT END OF
SD0394'TRUCK TRAVEL. FROM END OF TRUCK TRAVEL, WALK DUE E ABOUT 1/2 MILE
SD0394'TO STATION.
SD0394
SD0394   STATION RECOVERY (1940)
SD0394
SD0394'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1940
SD0394'RECOVERED IN GOOD CONDITION.
SD0394
SD0394   STATION RECOVERY (1951)
SD0394
SD0394'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1951 (CWC)
SD0394'RECOVERED
SD0394'
SD0394'THE STATION AND R.M. NO. 1 WERE RECOVERED IN GOOD CONDITION. GRAYS
SD0394'HARBOR EAST BASE WAS NOT RECOVERED. R.M. NO. 2 WAS ESTABLISHED.
SD0394'
SD0394'ABOUT 3/4 MILE EAST-NORTHEAST OF WESTPORT, ABOUT 3/4 MILE
SD0394'SOUTHEAST OF WESTHAVEN, ON THE EAST SIDE OF POINT CHEHALIS, ABOUT
SD0394'100 YARDS SOUTH OF THE PILING NEAR THE EAST END OF THE SOUTH JETTY,
SD0394'ABOUT 100 YARDS SOUTHWEST OF THE HIGH WATER LINE, ON THE NORTHEAST
SD0394'SIDE OF WESTPORT AIRPORT, ON TOP OF A FLAT SAND HILL SOUTHWEST OF
SD0394'AND SEPARATE FROM A SAND RIDGE AT THE STORM WATER LINE, 13.0
SD0394'FEET ABOVE M.S.L., 3 FEET EAST OF A WHITE WITNESS POST, AND SET
SD0394'IN TOP OF A SQUARE CONCRETE POST PROJECTING 3 INCHES, A STANDARD
SD0394'DISK STAMPED EAST BASE 2 1940.
SD0394'
SD0394'REFERENCE MARK NO. 1 (NOTE 11B) IS ON THE SOUTH SLOPE OF THE
SD0394'SAND HILL AND ABOUT 2 FEET LOWER THAN THE STATION AND PROJECTS
SD0394'12 INCHES. THE DISK IS STAMPED EAST BASE 2 NO 1 1940.
SD0394'
SD0394'REFERENCE MARK NO. 2 (NOTE 11A) IS AT THE NORTH END OF THE TOP OF
SD0394'THE SAND HILL AND PROJECTS 3 INCHES. THE DISK IS STAMPED EAST
SD0394'BASE 2 1940 NO 2.
SD0394'
SD0394'B.M. Y 295 (SEE DESCRIPTION THEREOF) IS 0.45 MILE SOUTH OF AND
SD0394'ACROSS THE AIRPORT FROM THE STATION.
SD0394
SD0394   STATION RECOVERY (1969)
SD0394
SD0394'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1969 (JBW)
SD0394'THE STATION AND R.M. NO. 2 WERE RECOVERED IN GOOD CONDITION. THE
SD0394'CONCRETE MONUMENT OF R.M. NO. 1 WAS FOUND, BUT THE DISK HAS BEEN

SD0394'REMOVED.
SD0394'
SD0394'THE STATION IS ABOUT 0.75 MILE EAST-NORTHEAST OF WESTPORT,
SD0394'ABOUT 0.75 MILE SOUTHEAST OF WESTHAVEN, ON THE EAST SIDE OF POINT
SD0394'CHEHALIS, ON TOP OF A FLAT SAND HILL SOUTHWEST OF AND SEPARATE FROM
SD0394'A SAND RIDGE AT THE STORM WATER LINE, 13.0 FEET ABOVE M.S.L., AND
SD0394'3 FEET EAST OF WHITE WITNESS POST.
SD0394'
SD0394'TO REACH THE STATION FROM THE WESTPORT POST OFFICE, GO 0.7
SD0394'MILE WEST ON N. MONTESANO AVE. TO WILSON STREET. TURN RIGHT AND GO
SD0394'0.1 MILE EAST ON WILSON STREET TO A DIRT ROADWAY. TURN RIGHT AND
SD0394'GO 0.2 MILE ON THE DIRT ROADWAY TO A CLEARED AREA ON THE RIGHT.
SD0394'FROM THE CENTER OF THE DIRT ROADWAY GO ABOUT 240 YARDS EAST ONTO
SD0394'A 7 FOOT HIGH SAND RIDGE. THEN GO ABOUT 71 YARDS SOUTHEAST TO A 10
SD0394'FOOT HIGH SAND DUNE (SURROUNDED BY WATER AT HIGH TIDE) AND THE
SD0394'STATION.
SD0394'
SD0394'THE STATION MARK IS A STANDARD U.S.C. AND G.S. TRIANGULATION DISK,
SD0394'STAMPED EAST BASE 2 1940, SET IN TOP OF A SQUARE CONCRETE POST
SD0394'PROJECTING 3 INCHES.
SD0394'
SD0394'THE REFERENCE MARK IS AT THE NORTH END OF THE TOP OF THE SAND
SD0394'HILL, ABOUT 7 METERS NORTH OF THE STATION. THE MARK IS A STANDARD
SD0394'U.S.C. AND G.S. REFERENCE DISK, STAMPED EAST BASE 2 NO. 2 1940, SET
SD0394'IN A CONCRETE POST PROJECTING 3 INCHES.
SD0394'
SD0394'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN
SD0394'ABOUT 0.75 MI. EAST-NORTHEAST OF WESTPORT.
SD0394
SD0394   STATION RECOVERY (1973)
SD0394
SD0394'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1973 (RMB)
SD0394'THE STATION AND REFERENCE MARK 2 WAS RECOVERED IN GOOD
SD0394'CONDITION. REFERENCE MARK 1 WAS FOUND DESTROYED, PROBABLY BY
SD0394'VANDALS WHO SMASHED THE TOP OF THE MONUMENT TO GET THE DISK.
SD0394'
SD0394'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN
SD0394'3/4 MILE EAST-NORTHEAST OF WESTPORT.
SD0394
SD0394   STATION RECOVERY (1985)
SD0394
SD0394'RECOVERY NOTE BY NATIONAL OCEAN SURVEY 1985 (RBM)
SD0394'THE STATION WAS RECOVERED AT THIS DATE.   THE STATION WAS RECOVERED
SD0394'IN GOOD CONDITION AS DESCRIBED.
SD0394'
SD0394'RECOVERED BY MJM.
SD0394
SD0394   STATION RECOVERY (1989)
SD0394
SD0394'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1989
SD0394'THE STATION IS LOCATED ABOUT 43.4 KM (27.0 MI) NORTH OF OCEAN PARK,
SD0394'35.4 KM (22.0 MI) NORTHWEST OF SOUTH BEND, 27.4 KM (17.0 MI)
SD0394'SOUTHWEST OF ABERDEEN AND ON THE TOP OF A FLAT SAND HILL ON THE EAST
SD0394'SIDE OF POINT CHELAIS.
SD0394'TO REACH FROM THE POST OFFICE IN WESTPORT, GO WEST ON NORTH MONTESANO
SD0394'AVENUE FOR 1.13 KM (0.70 MI) TO A CROSS ROAD. TURN RIGHT AND GO WEST
SD0394'ON WILSON STREET FOR 0.16 KM (0.10 MI) TO A SIDE ROAD RIGHT. TURN

SD0394'RIGHT AND GO NORTH ON THE GRAVELED ROAD FOR 0.16 KM (0.10 MI) TO A
SD0394'CABLE GATE, THE KEY CAN BE OBTAINED FROM THE CITY OFFICE, CALL AT
SD0394'LEAST A DAY BEFORE, PHONE NUMBER 206-268-0131. PASS THROUGH THE GATE
SD0394'AND CONTINUE AHEAD ON THE GRAVELED ROAD FOR 0.08 KM (0.05 MI) TO THE
SD0394'NORTHWEST CORNER OF THE CHAIN LINK FENCE AROUND THE COAST GUARD BASE
SD0394'AND A FORK. TAKE THE RIGHT FORK FOR 0.15 KM (0.09 MI) , THIS ROAD IS
SD0394'VERY SOFT SAND,IN DRY WEATHER IT MAY TAKE A FOURWHEEL DRIVE,TO THE
SD0394'BEACH AND THE END OF TRUCK TRAVEL. WALK SOUTHEASTERLY FOR ABOUT 150
SD0394'FT (45.7 M) TO A LONE BRUSH COVERED DUNE AND THE STATION. THIS DUNE
SD0394'IS ISOLATED FROM THE REST OF THE BEACH HIGHWATER LINE AND IS AN
SD0394'ISLAND AT EXTREME HIGH WATER.
SD0394'THE MARK IS SET IN THE TOP OF A SQUARE CONCRETE MONUMENT THAT IS FLUSH
SD0394'WITH THE GROUND SURFACE. IT IS 0.6 M (2.0 FT) NORTH OF A WITNESS POST
SD0394'AND ON THE HIGHEST PART OF THE DUNE.
SD0394
SD0394   STATION RECOVERY (1990)
SD0394
SD0394'RECOVERY NOTE BY MINISTER AND GLAESER 1990
SD0394'RECOVERED IN GOOD CONDITION.
SD0394
SD0394   STATION RECOVERY (1991)
SD0394
SD0394'RECOVERED 1991
SD0394'RECOVERED IN GOOD CONDITION.
SD0394
SD0394   STATION RECOVERY (1997)
SD0394
SD0394'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0394'RECOVERED AS DESCRIBED.

1 National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

SD0794 **********

SD0794 DESIGNATION - GRENVILLE
SD0794 PID - SD0794
SD0794 STATE/COUNTY- WA/GRAYS HARBOR
SD0794 USGS QUAD - TAHOLAH (1982)
SD0794
SD0794 *CURRENT SURVEY CONTROL
SD0794 ______
SD0794* NAD 83(1991)- 47 18 15.15012(N) 124 16 43.25125(W) ADJUSTED
SD0794* NAVD 88 - 37.63 (meters) 123.5 (feet) GPS OBS
SD0794 ______
SD0794 X - -2,440,370.678 (meters) COMP
SD0794 Y - -3,580,310.585 (meters) COMP
SD0794 Z - 4,664,773.963 (meters) COMP
SD0794 LAPLACE CORR- 6.90 (seconds) DEFLEC96
SD0794 ELLIP HEIGHT- 13.28 (meters) GPS OBS
SD0794 GEOID HEIGHT- -24.15 (meters) GEOID96
SD0794
SD0794 HORZ ORDER - FIRST
SD0794 ELLP ORDER - THIRD CLASS II
SD0794
SD0794.The horizontal coordinates were established by GPS observations
SD0794.and adjusted by the National Geodetic Survey in January 1999.
SD0794
SD0794.The orthometric height was determined by GPS observations and a
SD0794.high-resolution geoid model using precise GPS observation and
SD0794.processing techniques.
SD0794
SD0794.The X, Y, and Z were computed from the position and the ellipsoidal ht.
SD0794
SD0794.The Laplace correction was computed from DEFLEC96 derived deflections.
SD0794
SD0794.The ellipsoidal height was determined by GPS observations
SD0794.and is referenced to NAD 83.
SD0794
SD0794.The geoid height was determined by GEOID96.
SD0794

	North	East	Units	Scale	Converg.
SD0794;SPC WA S -	225,915.358	214,355.081	MT	0.99999347	-2 44 41.3
SD0794;UTM 10 -	5,239,763.362	403,341.326	MT	0.99971482	-0 56 23.5

SD0794

	Primary Azimuth Mark	Grid Az
SD0794:SPC WA S -	VILLE	082 53 48.6
SD0794:UTM 10 -	VILLE	081 05 30.8

SD0794

PID	Reference Object	Distance	Geod. Az
			dddmmss.s
SD0787	POINT GRENVILLE LORAN MAST	153.864 METERS	04240
	GRENVILLE RM 1	13.410 METERS	06433
SD0699	POINT GRENVILLE LOT 1953	APPROX. 3.8 KM	0795837.8
SD0697	VILLE	APPROX. 3.8 KM	0800907.3
	GRENVILLE RM 3	17.342 METERS	09145
	GRENVILLE RM 2	15.392 METERS	19752
SD0793	ROCK	166.005 METERS	25240
	GRENVILLE RM 2 RESET	10.735 METERS	32347

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SD0794| SD0790 NORTH 1927                              APPROX. 0.6 KM 3542506.7 |
SD0794|---------------------------------------------------------------------|
SD0794
SD0794                           SUPERSEDED SURVEY CONTROL
SD0794
SD0794  NAD 83(1991)-  47 18 15.14789(N)    124 16 43.26281(W) AD(       ) 2
SD0794  NAD 83(1986)-  47 18 15.13628(N)    124 16 43.27045(W) AD(       ) 2
SD0794  NAD 27      -  47 18 15.83300(N)    124 16 38.61100(W) AD(       ) 2
SD0794  NGVD 29     -        36.9    (m)          121.     (f) VERT ANG
SD0794
SD0794.Superseded values are not recommended for survey control.
SD0794.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0794.See file dsdata.txt to determine how the superseded data were derived.
SD0794
SD0794_MARKER: DD = SURVEY DISK
SD0794_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
SD0794_STAMPING: GRENVILLE XXVII
SD0794_PROJECTION: FLUSH
SD0794_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0794_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0794+STABILITY: SURFACE MOTION
SD0794
SD0794  HISTORY     - Date     Condition        Recov. By
SD0794  HISTORY     - 1927     MONUMENTED       CGS
SD0794  HISTORY     - 1951     MONUMENTED       CGS
SD0794  HISTORY     - 1953     MONUMENTED       CGS
SD0794  HISTORY     - 1962     MONUMENTED       CGS
SD0794  HISTORY     - 1969     MONUMENTED       CGS
SD0794  HISTORY     - 1974     MONUMENTED       RAYONI
SD0794  HISTORY     - 19971015 GOOD             WADECO
SD0794
SD0794                           STATION DESCRIPTION
SD0794
SD0794'DESCRIBED BY COAST AND GEODETIC SURVEY 1927 (TJM)
SD0794'ON THE WESTERNMOST PART OF POINT GRENVILLE ON THE LEVEL GRASSY AREA,
SD0794'23-1/2 METERS FROM THE EDGE OF THE BLUFF MEASURED IN LINE WITH
SD0794'100-FOOT ROCK CLOSE OFF POINT.  24 METERS FROM EDGE OF BLUFF IN
SD0794'LINE WITH STATION NORTH.  40.4 METERS FROM EDGE OF BLUFF IN LINE
SD0794'WITH STATION ARCH.
SD0794'
SD0794'STATION AND REFERENCE MARKS ARE STANDARD BRONZE DISKS SET IN
SD0794'CONCRETE, AS DESCRIBED IN NOTES 1A AND 11A.  THE STANDARD DISK IS
SD0794'STAMPED GRENVILLE XXVII.  THE DISK OF THE REFERENCE MARK IS STAMPED
SD0794'R.M.NO.1, GRENVILLE, XXVII.
SD0794'
SD0794'STATION CAN BEST BE REACHED BY FOLLOWING THE EDGE OF THE BLUFF
SD0794'FROM THE NW BY LEAVING THE OLD ROAD NEAR THE SMALL STREAM 500
SD0794'METERS TO THE N OF THE POINT.
SD0794'
SD0794'HEIGHT OF SIGNAL ABOVE STATION MARK - 8 METERS.
SD0794
SD0794                           STATION RECOVERY (1951)
SD0794
SD0794'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1951 (CWC)
SD0794'RECOVERED--
SD0794'
SD0794'THE STATION AND THE REFERENCE MARK WERE RECOVERED IN GOOD
```

SD0794'CONDITION. A NEW REFERENCE MARK WAS SET BY THIS PARTY.
SD0794'
SD0794'ON POINT GRENVILLE, 5.1 MILES AIRLINE FROM THE VILLAGE OF MOCLIPS,
SD0794'ON THE U.S. COAST GUARD RESERVATION, 154 METERS SOUTH-SOUTHWEST OF
SD0794'A 310-FOOT STEEL RADIO MAST, 23.5 METERS SOUTHEAST OF THE EDGE OF
SD0794'THE BLUFF, 24 METERS SOUTH OF THE EDGE OF THE BLUFF, 40.4 METERS
SD0794'EAST OF THE EDGE OF THE BLUFF, A STANDARD TRIANGULATION STATION
SD0794'MARK DISK STAMPED GRENVILLE XXVII SET IN TOP OF SQUARE CONCRETE
SD0794'MONUMENT.
SD0794'
SD0794'REFERENCE MARK 1 IS EAST OF THE STATION IN AREA COVERED BY GRASS
SD0794'AND SMALL BRUSH. IT IS A STANDARD REFERENCE DISK STAMPED
SD0794'GRENVILLE RM 1 XXVII SET IN TOP OF A SQUARE CONCRETE POST.
SD0794'
SD0794'REFERENCE MARK 2 IS SOUTH OF THE STATION, A STANDARD REFERENCE
SD0794'MARK DISK STAMPED GRENVILLE RM 2 1927 SET IN TOP OF A CONCRETE
SD0794'FILLED STOVE PIPE.
SD0794'
SD0794'TO REACH THE STATION FROM MOCLIPS, GO NORTH ALONG THE GRAVEL ROAD
SD0794'TOWARD TAHOLAH FOR 7.6 MILES TO A ROAD LEFT AND A SIGN COAST GUARD
SD0794'RESERVATION - NO VISITORS ALLOWED. TURN LEFT (WEST) FOR ABOUT ONE
SD0794'MILE TO THE END OF THE ROAD AND THE COAST GUARD STATION. DRIVE ON
SD0794'DIM TRACK ROAD TO THE END OF THE TRAIL AND PACK WEST FOR ABOUT 50
SD0794'YARDS AND THE STATION.
SD0794'
SD0794'THE DISTANCE TO THE OLD REFERENCE MARK DOES NOT CHECK WITH THAT
SD0794'REPORTED IN 1927.
SD0794
SD0794   STATION RECOVERY (1953)
SD0794
SD0794'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1953 (RAG)
SD0794'THE STATION MARK WAS RECOVERED AND FOUND TO BE IN GOOD
SD0794'CONDITION. REFERENCE MARK 1 WAS FOUND TO BE DESTROYED. TWO NEW
SD0794'REFERENCE MARKS WERE SET. NEW MARKS ARE STANDARD BRONZE DISKS
SD0794'SET IN CONCRETE AS DESCRIBED BY NOTES 11A.
SD0794'
SD0794'A COMPLETE DESCRIPTION FOLLOWS--
SD0794'
SD0794'THE STATION ON THE WESTERNMOST PART OF POINT GRENVILLE ON THE
SD0794'LEVEL GRASSY AREA, 76 FEET EAST FROM THE EDGE OF THE BLUFF MEASURED
SD0794'IN LINE WITH 100-FOOT ROCK CLOSE OFF POINT, 128 FEET NORTHWEST OF
SD0794'THE MOST SOUTHERLY OF TWO GUYED POLES, AND 111 FEET WEST OF THE
SD0794'MOST NORTHERLY OF TWO GUYED POLES. THE STATION IS ON PROPERTY OF
SD0794'THE U.S. COAST GUARD.
SD0794'
SD0794'TO REACH FROM THE POST OFFICE IN PACIFIC BEACH, GO WEST AND NORTH
SD0794'ON STATE HIGHWAY 9C FOR 2.0 MILES TO A FORK AND THE MOCLIPS POST
SD0794'OFFICE ON THE LEFT. TAKE LEFT FORK, GO 0.3 MILE TO A T-ROAD
SD0794'INTERSECTION. TURN RIGHT, CONTINUE ON STATE HIGHWAY 9C FOR 6.0
SD0794'MILES TO A SIDE ROAD LEFT AT SIGN ON LEFT, U.S. COAST GUARD POINT
SD0794'GRENVILLE. TURN LEFT, GO 0.6 MILE TO COAST GUARD BUILDINGS.
SD0794'KEEP RIGHT AND GO BETWEEN BUILDINGS AND THEN SOUTH ON A TRACK
SD0794'ROAD FOR 0.25 MILE TO THE STATION.
SD0794'
SD0794'STATION MARK, A STANDARD DISK IN A CONCRETE MONUMENT, STAMPED
SD0794'GRENVILLE XXV11 IS 3 FEET EAST OF A STANDARD WITNESS POST. MONUMENT
SD0794'PROJECTS 6 INCHES FROM GROUND.

SD0794'
SD0794'REFERENCE MARK 2 IS 76 FEET EAST-NORTHEAST FROM THE EDGE OF THE
SD0794'BLUFF MEASURED IN LINE WITH 100-FOOT ROCK CLOSE OFF POINT. THE
SD0794'DISK IS STAMPED GRENVILLE NO 2 1927. THE CONCRETE POST PROJECTS
SD0794'4 INCHES FROM GROUND.
SD0794'
SD0794'REFERENCE MARK 3 IS 62 FEET WEST OF THE MOST NORTHERLY OF TWO
SD0794'GUYED POLES, AND 81 FEET NORTHWEST OF THE MOST SOUTHERLY OF TWO
SD0794'GUYED POLES. THE DISK IS STAMPED GRENVILLE NO 3 1927. THE
SD0794'CONCRETE POST PROJECTS 6 INCHES FROM GROUND.
SD0794'
SD0794'NO AZIMUTH MARK WAS ESTABLISHED. TRIANGULATION STATION VILLE CAN
SD0794'BE USED FOR THE AZIMUTH MARK.
SD0794'
SD0794'NOTE--A 4 FT. STAND WAS USED.
SD0794
SD0794   STATION RECOVERY (1962)
SD0794
SD0794'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1962 (MEW)
SD0794'THE STATION WAS RECOVERED AS DESCRIBED ON PAGE 14, BOOK 1152, IN
SD0794'1953. THE STATION MARK AND REFERENCE MARKS 2 AND 3 WERE RECOVERED
SD0794'IN GOOD CONDITION. A REFERENCE MARK WAS SET IN 1951 WHICH WAS
SD0794'STAMPED GRENVILLE RM 2 1927. IT IS SOUTH OF THE STATION SET IN A
SD0794'CONCRETE-FILLED STOVE PIPE. THIS MARK WAS NOT RECOVERED, BUT A
SD0794'THOROUGH SEARCH WAS NOT MADE FOR IT. THE OTHER REFERENCE MARK 2
SD0794'WHICH WAS SET IN 1953 IS NORTH OF THE STATION IN A SQUARE
SD0794'CONCRETE POST. NO OBSERVATIONS WERE MADE FROM THE STATION DURING
SD0794'THIS RECOVERY.
SD0794
SD0794   STATION RECOVERY (1969)
SD0794
SD0794'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1969 (JBW)
SD0794'THE STATION AND REFERENCE MARKS RM NO. 2 AND RM NO. 3 WERE RECOVERED
SD0794'IN GOOD CONDITION.
SD0794'
SD0794'THE STATION IS ON THE WESTERNMOST PART OF POINT GRENVILLE ON THE
SD0794'LEVEL GRASSY AREA, 76 FEET EAST FROM THE EDGE OF THE BLUFF MEASURED
SD0794'IN LINE WITH AN 100 FOOT ROCK CLOSE OFF THE POINT, 128 FEET
SD0794'NORTHWEST OF THE MOST SOUTHERLY OF TWO GUYED POLES, AND 111 FEET
SD0794'WEST OF THE MOST NORTHERLY OF TWO GUYED POLES. THE STATION IS ON
SD0794'PROPERTY BELONGING TO THE U.S. COAST GUARD.
SD0794'
SD0794'TO REACH THE STATION FROM THE POST OFFICE IN PACIFIC BEACH, GO
SD0794'EAST ON MAIN STREET TO THE JUNCTION OF MAIN STREET AND WASHINGTON
SD0794'STATE HIGHWAY NO. 109. TURN LEFT ONTO STATE HIGHWAY NO. 109 AND
SD0794'GO NORTH FOR 8.6 MILES TO THE POINT GRENVILLE U.S. COAST GUARD
SD0794'LORAN STATION DRIVE-WAY ON THE LEFT SIDE OF STATE HIGHWAY
SD0794'NO. 109. TURN LEFT AND DRIVE TO THE U.S. COAST GUARD STATION
SD0794'AND THE STATION.
SD0794'
SD0794'THE STATION IS A STANDARD USC AND GS TRIANGULATION DISK STAMPED
SD0794'GRENVILLE XXVII, SET IN A CONCRETE MONUMENT PROJECTING 6 INCHES
SD0794'ABOVE THE GROUND, AND 3 FEET EAST OF A STANDARD WITNESS POST.
SD0794'
SD0794'REFERENCE MARK 2 IS A STANDARD USC AND GS REFERENCE MARK, STAMPED
SD0794'GRENVILLE NO 2 1927, SET IN A CONCRETE POST PROJECTING 4 INCHES
SD0794'FROM THE GROUND. THE DISK IS 76 FEET EAST-NORTHEAST FROM THE EDGE

SD0794'OF THE BLUFF MEASURED IN LINE WITH AN 100 FOOT ROCK CLOSE OFF THE
SD0794'POINT.
SD0794'
SD0794'REFERENCE MARK 3 IS A STANDARD USC AND GS REFERENCE MARK STAMPED,
SD0794'GRENVILLE NO 3 1927, SET IN A CONCRETE POST PROJECTING 6 INCHES
SD0794'FROM THE GROUND. THE DISK IS 62 FEET WEST OF THE MOST NORTHERLY
SD0794'OF TWO GUYED POLES, AND 81 FEET NORTHWEST OF THE MOST SOUTHERLY OF
SD0794'TWO GUYED POLES.
SD0794'
SD0794'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN
SD0794'ABOUT 4.5 MILES NORTH OF MOCLIPS.
SD0794
SD0794   STATION RECOVERY (1974)
SD0794
SD0794'RECOVERY NOTE BY ITT RAYONIER INCORPORATED 1974
SD0794'THE STATION AND REFERENCE MARKS NO. 2 AND NO. 3 WERE RECOVERED IN
SD0794'GOOD CONDITION.
SD0794'
SD0794'REFERENCE MARK NO. 2 BEARS NORTH 36 DEG WEST, AND REFERENCE MARK
SD0794'NO. 3 BEARS SOUTH 87 DEG EAST.
SD0794'
SD0794'THE SOUTHERLY GUYED POWER POLE BEARS SOUTH 62 DEG EAST 118 FEET
SD0794'(PACED DISTANCE) FROM THE STATION AND SOUTH 42 DEG EAST 75 FEET
SD0794'(PACED DISTANCE) FROM REFERENCE MARK NO. 3. THE LORAN MAST BEARS
SD0794'NORTH 43 DEG EAST. THE SOUTHWEST CORNER OF A FOUR POLE LIGHT
SD0794'PLATFORM BEARS NORTH 55 DEG EAST 24 FEET. THE SURVEY MARKER POST
SD0794'BEARS SOUTH 21 DEG WEST 26 INCHES.
SD0794'
SD0794'THE STATION AND REFERENCE MARKS BECOME COVERED WITH HIGH GRASS
SD0794'AND ARE DIFFICULT TO FIND.
SD0794'
SD0794'TO REACH THE STATION FROM THE U.S. POST OFFICE ON STATE HIGHWAY
SD0794'109 AT MOCLIPS, WASHINGTON, GO NORTH ALONG STATE HIGHWAY 109 TOWARD
SD0794'TAHOLAH FOR 6.6 MILES TO T ROAD LEFT WHICH GOES TO THE U.S. COAST
SD0794'GUARD STATION ON POINT GRENVILLE (THERE IS A SIGN HERE). TURN
SD0794'LEFT ON THE COAST GUARD ROAD AND GO 0.65 MILE TO THE
SD0794'BUILDINGS. PARK HERE AND GO NORTHWEST THROUGH THE BUILDING AREA
SD0794'TO THE TRUCK ROAD GOING SOUTHWEST. A BRIDGE IS OUT ON THIS
SD0794'ROAD, AND IT IS NOW NECESSARY TO WALK THE 0.25 MILE TO THE
SD0794'STATION.
SD0794
SD0794   STATION RECOVERY (1997)
SD0794
SD0794'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0794'RECOVERED AS DESCRIBED. THE USCG STATION IN THE DESCRIPTION HAS
SD0794'CLOSED AND THE PROPERTY IS NOW PART OF THE QUINAULT INDIAN
SD0794'RESERVATION. A NGS ORANGE WITNESS POST WAS PLACED ABOUT 1 M (3.3 FT)
SD0794'EAST OF THE STATION.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0020 ***********************************************************************
 SD0020  TIDAL BM    -  This is a Tidal Bench Mark.
 SD0020  DESIGNATION -  GUNVILLE
 SD0020  PID         -  SD0020
 SD0020  STATE/COUNTY-  WA/GRAYS HARBOR
 SD0020  USGS QUAD   -  GRAYLAND (1985)
 SD0020
 SD0020                         *CURRENT SURVEY CONTROL
 SD0020  ______________________________________________________________________
 SD0020* NAD 83(1991)-  46 51 42.23944(N)    124 04 23.36012(W)     ADJUSTED
 SD0020* NAVD 88     -         4.934  (meters)      16.19   (feet)  ADJUSTED
 SD0020  ______________________________________________________________________
 SD0020  X           -  -2,447,682.387 (meters)                     COMP
 SD0020  Y           -  -3,618,862.850 (meters)                     COMP
 SD0020  Z           -   4,631,254.038 (meters)                     COMP
 SD0020  LAPLACE CORR-          14.31  (seconds)                    DEFLEC96
 SD0020  ELLIP HEIGHT-         -19.41  (meters)                     GPS OBS
 SD0020  GEOID HEIGHT-         -24.19  (meters)                     GEOID96
 SD0020  DYNAMIC HT  -           4.934 (meters)      16.19  (feet)  COMP
 SD0020  MODELED GRAV-     980,747.0   (mgal)                       NAVD 88
 SD0020
 SD0020  HORZ ORDER  -  FIRST
 SD0020  VERT ORDER  -  FIRST     CLASS II
 SD0020  ELLP ORDER  -  THIRD     CLASS II
 SD0020
 SD0020.The horizontal coordinates were established by GPS observations
 SD0020.and adjusted by the National Geodetic Survey in January 1999.
 SD0020
 SD0020.The orthometric height was determined by differential leveling
 SD0020.and adjusted by the National Geodetic Survey in June 1991.
 SD0020.WARNING-Repeat measurements at this control monument indicate possible
 SD0020.vertical movement.
 SD0020
 SD0020.This mark is designated as VM 8971 in the Oceanographic Products
 SD0020.and Services Division Tidal Bench Mark database.
 SD0020
 SD0020.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0020
 SD0020.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0020
 SD0020.The ellipsoidal height was determined by GPS observations
 SD0020.and is referenced to NAD 83.
 SD0020
 SD0020.The geoid height was determined by GEOID96.
 SD0020
 SD0020.The dynamic height is computed by dividing the NAVD 88
 SD0020.geopotential number by the normal gravity value computed on the
 SD0020.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 SD0020.degrees latitude (G = 980.6199 gals.).
 SD0020
 SD0020.The modeled gravity was interpolated from observed gravity values.
 SD0020
 SD0020;                    North         East     Units   Scale      Converg.
 SD0020;SPC WA S     -   176,052.922   227,653.074   MT  0.99992624 -2 35 43.9
 SD0020;UTM  10      - 5,190,358.218   418,202.796   MT  0.99968223 -0 46 59.3
 SD0020
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SD0020:                Primary Azimuth Mark                     Grid Az
SD0020:SPC WA S     -  WESTPORT MUNICIPAL TANK                  326 49 01.9
SD0020:UTM  10      -  WESTPORT MUNICIPAL TANK                  325 00 17.3
SD0020
SD0020|---------------------------------------------------------------------|
SD0020| PID    Reference Object                    Distance      Geod. Az  |
SD0020|                                                          dddmmss.s |
SD0020| SD0023 GUNVILLE RM 3                        9.492 METERS 15808     |
SD0020| SD0022 GUNVILLE RM 2                       19.194 METERS 25138     |
SD0020| SD0021 GUNVILLE RM 1                       17.483 METERS 30931     |
SD0020| SD0413 WESTPORT MUNICIPAL TANK            APPROX. 4.4 KM 3241318.0 |
SD0020|---------------------------------------------------------------------|
SD0020
SD0020                          SUPERSEDED SURVEY CONTROL
SD0020
SD0020  NAD 83(1991)-  46 51 42.24380(N)    124 04 23.36385(W) AD(       ) 2
SD0020  NAD 83(1986)-  46 51 42.23619(N)    124 04 23.35961(W) AD(       ) 2
SD0020  NAD 27      -  46 51 42.90300(N)    124 04 18.74400(W) AD(       ) 2
SD0020  NGVD 29     -         3.937  (m)           12.92   (f) ADJ UNCH    1 2
SD0020
SD0020.Superseded values are not recommended for survey control.
SD0020.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0020.See file dsdata.txt to determine how the superseded data were derived.
SD0020
SD0020_STAMPING: GUNVILLE 1939
SD0020_PROJECTION: FLUSH
SD0020_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0020_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0020+STABILITY: SURFACE MOTION
SD0020
SD0020  HISTORY     - Date     Condition        Recov. By
SD0020  HISTORY     - 1940     MONUMENTED       CGS
SD0020  HISTORY     - 1944     MONUMENTED       CGS
SD0020  HISTORY     - 1952     MONUMENTED       CGS
SD0020  HISTORY     - 1967     MONUMENTED       CGS
SD0020  HISTORY     - 1968     MONUMENTED       CGS
SD0020  HISTORY     - 1968     GOOD             NGS
SD0020  HISTORY     - 1976     GOOD             LOCENG
SD0020  HISTORY     - 1977     GOOD             NGS
SD0020  HISTORY     - 1977     GOOD             NGS
SD0020  HISTORY     - 1985     GOOD             NOS
SD0020  HISTORY     - 1989     GOOD             USPSQD
SD0020  HISTORY     - 19970730 GOOD             WADECO
SD0020
SD0020                          STATION DESCRIPTION
SD0020
SD0020'DESCRIBED BY COAST AND GEODETIC SURVEY 1940 (GLB)
SD0020'STATION MARK AND REFERENCE MARK NO.2 ARE STANDARD BRONZE DISKS
SD0020'SET IN CONCRETE AS DESCRIBED IN NOTES 1A AND 11A.
SD0020'
SD0020'REFERENCE MARK NO.1 IS A STANDARD BRONZE DISK SET IN CONCRETE,
SD0020'IN THE TOP OF A TILE.
SD0020'
SD0020'REFERENCE MARK NO.1 IS 19 FEET N OF THE CENTER LINE OF HIGHWAY 13A.
SD0020'
SD0020'REFERENCE MARK NO.2 IS 1 FOOT N OF FENCE LINE AND 28.5 FEET S OF
SD0020'CENTER LINE HIGHWAY 13A.
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SD0020'
SD0020'STATION IS REACHED AS FOLLOWS FROM SOUTH ABERDEEN, ON STATE
SD0020'HIGHWAY 13A, GO SOUTHWESTERLY TOWARDS WESTPORT, FOR 17.8 MILES TO
SD0020'STATION AT THE W END OF THE BAY CITY DRAWBRIDGE, 30 FEET S OF THE
SD0020'CENTER LINE OF HIGHWAY 13A, AND 4.5 FEET N OF E AND W FENCE LINE.
SD0020
SD0020 STATION RECOVERY (1944)
SD0020
SD0020'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1944 (HCW)
SD0020'STATION MARK IS A BRONZE STATION DISK, STAMPED GUNVILLE 1939, SET
SD0020'IN THE TOP OF A CONCRETE POST, ABOUT 0.6 MILE W ALONG STATE HIGHWAY
SD0020'13A FROM BAY CITY, AT THE W END OF LONG HIGHWAY BRIDGE, 30 FEET S
SD0020'OF CENTER LINE OF HIGHWAY, 6 INCHES N OF FENCE LINE, AND 23 FEET
SD0020'W OF SW BANK OF SOUTH BAY.
SD0020'
SD0020'REFERENCE MARK 1 IS A BRONZE REFERENCE DISK, STAMPED GUNVILLE
SD0020'NO 1 1939, SET IN THE TOP OF CONCRETE-FILLED TILE, 57.25 FEET
SD0020'NW OF STATION MARK, 19 FEET N OF CENTER LINE OF HIGHWAY, AND 20
SD0020'FEET SW OF SW BANK OF SOUTH BAY.
SD0020'
SD0020'REFERENCE MARK 2 IS A BRONZE REFERENCE DISK, STAMPED GUNVILLE
SD0020'NO 2 1939, SET IN THE TOP OF CONCRETE POST, 62.94 FEET W OF STATION
SD0020'MARK, 28.5 FEET S OF CENTER LINE OF HIGHWAY, AND 1/2-FOOT N OF
SD0020'A FENCE LINE.
SD0020
SD0020 STATION RECOVERY (1952)
SD0020
SD0020'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1952 (CWC)
SD0020'RECOVERED
SD0020'
SD0020'THE STATION AND BOTH REFERENCE MARKS WERE RECOVERED IN GOOD
SD0020'CONDITION.
SD0020'
SD0020'ABOUT 2-1/2 MILES SOUTHEAST OF WESTPORT, ABOUT 1/2 MILE WEST OF
SD0020'BAY CITY, AT THE WEST END OF STATE HIGHWAY 13A BRIDGE OVER SOUTH
SD0020'BAY, 30 FEET SOUTH OF THE CENTERLINE OF THE HIGHWAY, 22 FEET WEST
SD0020'OF THE WEST SHORE OF SOUTH BAY, 12 FEET WEST OF A TELEPHONE POLE
SD0020'AND 0.6 FOOT NORTH OF A WHITE PICKET FENCE, A STANDARD
SD0020'TRIANGULATION STATION MARK DISK STAMPED GUNVILLE 1939 SET IN TOP OF
SD0020'A SQUARE CONCRETE POST PROJECTING 3 INCHES.
SD0020'
SD0020'REFERENCE MARK 1 IS 19 FEET NORTH OF THE CENTERLINE OF THE
SD0020'HIGHWAY, 18 FEET WEST OF THE WEST SHORE OF SOUTH BAY, AND 7 FEET
SD0020'EAST OF A POWER POLE NUMBER W-16-27. A STANDARD REFERENCE MARK
SD0020'DISK STAMPED GUNVILLE NO. 1 1939 SET IN THE TOP OF A CYLINDRICAL
SD0020'CONCRETE POST PROJECTING 4 INCHES.
SD0020'
SD0020'REFERENCE MARK 2 IS WEST OF THE STATION, 28 FEET SOUTH OF THE
SD0020'CENTERLINE OF THE HIGHWAY, 0.5 FOOT NORTH OF A WHITE PICKET FENCE,
SD0020'A STANDARD REFERENCE MARK DISK STAMPED GUNVILLE NO 2 1939 SET IN
SD0020'THE TOP OF A SQUARE CONCRETE POST PROJECTING 6 INCHES.
SD0020
SD0020 STATION RECOVERY (1967)
SD0020
SD0020'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1967 (BIW)
SD0020'THE STATION AND BOTH REFERENCE MARKS WERE RECOVERED IN GOOD
SD0020'CONDITION. A REVISED DESCRIPTION FOLLOWS--THE STATION IS ABOUT

SD0020'160 FEET WNW OF THE CENTERLINE OF HIGHWAY 105 AT THE WEST END OF
SD0020'THE BRIDGE OVER SOUTH BAY AND 30 FEET SOUTH OF THE CENTERLINE OF
SD0020'OLD HIGHWAY 13A. THE ORIGINAL BRIDGE HAS BEEN REMOVED. STATION
SD0020'IS ALSO 22 FEET WEST OF THE WEST SHORE OF SOUTH BAY, 12 FEET
SD0020'WEST OF A TELEPHONE POLE, AND 0.6 FOOT NORTH OF A WHITE PICKET
SD0020'FENCE. IT IS A STANDARD TRIANGULATION -STATION DISC,
SD0020'STAMPED GUNVILLE 1939 AND SET IN THE TOP OF A SQUARE
SD0020'CONCRETE POST PROJECTING 3 INCHES.
SD0020'
SD0020'REFERENCE MARK 1 IS 19 FEET NORTH OF THE CENTERLINE OF THE OLD
SD0020'HIGHWAY, 18 FEET WEST OF THE WEST SHORE OF SOUTH BAY, AND 7 FEET
SD0020'EAST OF POWER POLE W-16-27. IT IS A STANDARD REFERENCE MARK DISC
SD0020'STAMPED GUNVILLE NO 1 1939 AND SET IN THE TOP OF A CYLINDRICAL
SD0020'CONCRETE POST PROJECTING 4 INCHES.
SD0020'
SD0020'REFERENCE MARK 2 IS WEST OF THE STATION, 28 FEET SOUTH OF THE
SD0020'CENTERLINE OF THE OLD HIGHWAY AND 0.5 FOOT NORTH OF THE PROJECTED
SD0020'CENTERLINE OF THE WHITE PICKET FENCE. IT IS A STANDARD DISC
SD0020'STAMPED GUNVILLE NO 2 1939 AND SET IN THE TOP OF A SQUARE CONCRETE
SD0020'POST PROJECTING 6 INCHES.
SD0020'
SD0020'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN
SD0020'2.2 MILES SW OF WESTPORT.
SD0020
SD0020   STATION RECOVERY (1968)
SD0020
SD0020'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1968 (CS)
SD0020'THE STATION, REFERENCE MARKS 1 AND 2 WERE RECOVERED IN GOOD
SD0020'CONDITION AND LEVELED OVER.
SD0020'
SD0020'TO REACH FROM THE POST OFFICE AT WESTPORT, GO 2.4 MILE SOUTH
SD0020'ALONG MONTESANO AVENUE, THENCE 1.25 MILES EAST ALONG STATE HIGHWAY
SD0020'105, IN R11W T16N, SECTION 20.
SD0020'
SD0020'THE STATION IS A C AND GS TRIANGULATION STATION DISK, STAMPED
SD0020'GUNVILLE 1939. 0.1 MILE WEST OF THE WEST END OF A CONCRETE BRIDGE
SD0020'OVER ELK CREEK, 187 FEET NORTH OF THE CENTER LINE OF THE HIGHWAY,
SD0020'42.0 FEET EAST-NORTHEAST OF THE NORTHEAST CORNER OF A HOUSE, IN
SD0020'THE TOP OF A CONCRETE POST.
SD0020'
SD0020'R.M. 1 IS A C AND GS REFERENCE MARK DISK, STAMPED GUNVILLE NO 1
SD0020'1939. 57.3 FEET NORTH-NORTHWEST OF THE STATION, IN A CONCRETE POST.
SD0020'
SD0020'R.M. 2 IS A C AND GS REFERENCE MARK DISK, STAMPED GUNVILLE NO 2
SD0020'1939. 63.0 FEET WEST OF THE STATION, IN THE TOP OF A CONCRETE POST.
SD0020'
SD0020'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN
SD0020'ABOUT 3 MILE SOUTHEAST OF WESTPORT.
SD0020
SD0020   STATION RECOVERY (1968)
SD0020
SD0020'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1968
SD0020'3.65 MI SE FROM WESTPORT.
SD0020'TO REACH FROM THE POST OFFICE IN WESTPORT GO SOUTH ON MONTESANO AVE
SD0020'FOR 2.4 MILES THEN EAST ON STATE HIGHWAY 105 FOR 1.15 MILES, THEN LEFT
SD0020'50 YARDS TO T INTERSECTION, TURN R AND GO E 0.15 MILE TO MARK 20 FEET
SD0020'WEST OF THE BANK AT THE HIGH WATER LINE, BETWEEN THE SHD SHOP

SD0020'BUILDINGS AND CRABPOT SEAFOOD BUILDINGS, 26 FEET SOUTH OF THE
SD0020'PROJECTED SOUTH SIDE OF THE ENTRANCE ROAD (WHICH WAS ONCE THE STATE
SD0020'HIGHWAY) 9.5 FEET WEST OF A TELEPHONE POLE AND 1.5 FEET WEST OF A
SD0020'METAL WITNESS POST. A TRIANGULATION STATION DISK IN A SQUARE CONCRETE
SD0020'POST PROJECTING 4 INCHES.
SD0020
SD0020   STATION RECOVERY (1976)
SD0020
SD0020'RECOVERY NOTE BY LOCAL ENGINEER (INDIVIDUAL OR FIRM) 1976
SD0020'FOUND AS DESCRIBED. ASPHALT ROAD REFENCED TO RUN PARALLEL TO STATE
SD0020'HWY. HOUSE 42 FT. SW OF MON. GONE, PWER POLE W16-28 GONE. BRIDGE OVER
SD0020'ELK RIVER, NOT CREEK. MONUMENT IN OPEN AREA NW OF STATE GRAVEL STOCK
SD0020'YARD.
SD0020
SD0020   STATION RECOVERY (1977)
SD0020
SD0020'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1977 (CLN)
SD0020'THE STATION MARK, REFERENCE MARKS NO.1 AND NO. 2 WERE RECOVERED AND
SD0020'APPEAR TO BE IN GOOD CONDITION, BUT DISTANCES SHOW THE FOLLOWING
SD0020'DISCREPANCIES WHEN COMPARED TO 1940 MEASUREMENTS--R.M. 1 .033M
SD0020'LONGER. R.M. 2 .009 M LONGER. ANGLE BETWEEN MARKS 7 MINUTES 27
SD0020'SECONDS SMALLER. LEVELS WERE RUN OVER THE MARKS IN 1968 AND
SD0020'AGAIN DURING THIS VISIT. REFERENCE MARK NO. 2 IS ABOUT 0.1 FOOT
SD0020'LOWER. THIS MARK IS LOCATED IN A DRIVEWAY AND POSSIBLY
SD0020'TRAFFIC HAS CAUSED IT TO SETTLE. A NEW MARK, REFERENCE MARK NO. 3
SD0020'WAS ESTABLISHED.
SD0020'
SD0020'THE STATION IS LOCATED ABOUT 2-1/2 MILES SOUTHEAST OF WESTPORT,
SD0020'1/2 MILE WEST OF BAY CITY, IN THE YARD AT THE HIGHWAY DEPARTMENT
SD0020'SHOP BUILDINGS, ABOUT 50 YARDS NORTH OF STATE HIGHWAY 105 AND 20
SD0020'FEET WEST OF THE BANK AT THE HIGH WATER LINE.
SD0020'
SD0020'TO REACH FROM THE POST OFFICE IN WESTPORT, GO SOUTH ON MONTESANO
SD0020'AVENUE FOR 2.4 MILES, TURN LEFT AND GO EAST ON STATE HIGHWAY 105
SD0020'FOR 1.15 MILES TO A ROAD LEFT, 0.15 MILE BEFORE REACHING THE
SD0020'BRIDGE OVER ELK RIVER. TURN LEFT, GO 50 YARDS TO A
SD0020'T-INTERSECTION, TURN RIGHT AND GO EAST 0.15 MILE TO THE WATERS
SD0020'EDGE BETWEEN THE STATE HIGHWAY DEPARTMENT SHOP BUILDINGS AND
SD0020'CRABPOT SEAFOOD BUILDINGS. (AT ONE TIME THIS ROAD WAS THE
SD0020'STATE HIGHWAY).
SD0020'
SD0020'THE STATION MARK, STAMPED GUNVILLE 1939, IS A STANDARD DISK SET
SD0020'IN A SQUARE CONCRETE POST WHICH PROJECTS 4 INCHES. IT IS 26 FEET
SD0020'SOUTH OF THE PROJECTED SOUTH SIDE OF THE ENTRANCE ROAD (WHICH WAS
SD0020'ONCE THE STATE HIGHWAY), 20 FEET WEST OF THE BANK AT THE HIGH
SD0020'WATER LINE, 9.5 FEET WEST OF A TELEPHONE POLE, AND 1.5 FEET WEST
SD0020'OF A METAL WITNESS POST.
SD0020'
SD0020'REFERENCE MARK NO. 1, STAMPED GUNVILLE NO 1 1939, IS A STANDARD
SD0020'DISK SET IN CONCRETE 2 INCHES BELOW GROUND, 18.5 FEET SOUTH OF THE
SD0020'SOUTHWEST CORNER OF THE CRABPOT SEAFOOD BUILDING, 7 FEET NORTH OF
SD0020'THE PROJECTED NORTH SIDE OF THE ENTRANCE ROAD AND 7 FEET EAST OF
SD0020'A POWER POLE. REFERENCE MARK NO. 2, STAMPED GUNVILLE NO 2 1939,
SD0020'IS A STANDARD DISK SET IN A SQUARE CONCRETE POST WHICH PROJECTS
SD0020'2 INCHES. IT IS 89.5 FEET NORTHEAST OF THE NORTHEAST CORNER OF
SD0020'THE 12-FOOT SQUARE HWY DEPT. ROAD SHOP OFFICE BLDG, 19 FEET
SD0020'SOUTH OF THE PROJECTED SOUTH SIDE OF THE ENTRANCE ROAD AND AT

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SD0020'THE EASTERN END OF A CIRCULAR DRIVEWAY AROUND A GRAVEL PILE IN
SD0020'FRONT OF THE HIGHWAY DEPARTMENT BUILDINGS.
SD0020'
SD0020'REFERENCE MARK NO. 3, STAMPED GUNVILLE 1939 NO 3 1977, IS A
SD0020'STANDARD DISK SET IN A ROUND CONCRETE POST WHICH PROJECTS 3
SD0020'INCHES.  IT IS 35 FEET NORTH OF AN 18-INCH PINE TREE, 16 FEET WEST
SD0020'OF THE BANK AT THE HIGH WATER LINE AND 32 FEET SOUTH-SOUTHWEST OF
SD0020'A TELEPHONE POLE.
SD0020'
SD0020'FOLLOWING IS THE DIFFERENCE IN ELEVATION OF THE R.M.S FROM
SD0020'STATION MK.
SD0020'
SD0020'REFERENCE MARK NO. 1 = -1.245 FEET
SD0020'
SD0020'REFERENCE MARK NO. 2 = +1.209 FEET
SD0020'
SD0020'REFERENCE MARK NO. 3 = -0.005 FEET
SD0020'
SD0020'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN
SD0020'2-1/2 MILES SOUTHEAST OF WESTPORT.
SD0020
SD0020                          STATION RECOVERY (1977)
SD0020
SD0020'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1977
SD0020'RECOVERED IN GOOD CONDITION.
SD0020
SD0020                          STATION RECOVERY (1985)
SD0020
SD0020'RECOVERY NOTE BY NATIONAL OCEAN SURVEY 1985 (RBM)
SD0020'THE STATION WAS RECOVERED AT THIS DATE.
SD0020'THE STATION AND ALL REFERENCE MARKS WERE RECOVERED IN GOOD
SD0020'CONDITION AS DESCRIBED. THE TO REACH IS ADEQUATE FOR RECOVERY WITH
SD0020'THE EXCEPTION OF CRABPOT SEAFOODS IS NOW KNOWN AS BRADYS OYSTERS.
SD0020'
SD0020'RECOVERED BY M.J. MCEWEN.
SD0020
SD0020                          STATION RECOVERY (1989)
SD0020
SD0020'RECOVERY NOTE BY US POWER SQUADRON 1989 (DJM)
SD0020'RECOVERED IN GOOD CONDITION.
SD0020
SD0020                          STATION RECOVERY (1997)
SD0020
SD0020'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0020'RECOVERED AS DESCRIBED.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SY5644 ***********************************************************************
 SY5644  FBN         -  This is a Candidate for Federal Base Network Control.
 SY5644  DESIGNATION -  HATCHERY
 SY5644  PID         -  SY5644
 SY5644  STATE/COUNTY-  WA/GRAYS HARBOR
 SY5644  USGS QUAD   -  HUMPTULIPS (1990)
 SY5644
 SY5644                         *CURRENT SURVEY CONTROL
 SY5644  ______________________________________________________________________
 SY5644* NAD 83(1991)-  47 13 53.49477(N)    123 59 07.55831(W)     ADJUSTED
 SY5644* NAVD 88     -        36.50   (meters)     119.8    (feet)  N HEIGHT
 SY5644  ______________________________________________________________________
 SY5644  X           -  -2,425,331.931 (meters)                     COMP
 SY5644  Y           -  -3,597,675.166 (meters)                     COMP
 SY5644  Z           -   4,659,290.533 (meters)                     COMP
 SY5644  LAPLACE CORR-          12.93  (seconds)                    DEFLEC96
 SY5644  ELLIP HEIGHT-          12.98  (meters)                     GPS OBS
 SY5644  GEOID HEIGHT-         -23.38  (meters)                     GEOID96
 SY5644  DYNAMIC HT  -          36.50  (meters)     119.8   (feet)  COMP
 SY5644  MODELED GRAV-     980,769.3   (mgal)                       NAVD 88
 SY5644
 SY5644  HORZ ORDER  -  B
 SY5644  VERT ORDER  -  THIRD
 SY5644  ELLP ORDER  -  THIRD     CLASS II
 SY5644
 SY5644.The horizontal coordinates were established by GPS observations
 SY5644.and adjusted by the National Geodetic Survey in May 1991.
 SY5644
 SY5644.The orthometric height was determined by differential leveling
 SY5644.and adjusted by the National Geodetic Survey in October 1996.
 SY5644.The height was determined by precise leveling from only one NSRS
 SY5644.bench mark.  This was not adequate "tie leveling" to NSRS and was
 SY5644.allowed ONLY to validate the GPS-derived height.
 SY5644
 SY5644.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SY5644
 SY5644.The Laplace correction was computed from DEFLEC96 derived deflections.
 SY5644
 SY5644.The ellipsoidal height was determined by GPS observations
 SY5644.and is referenced to NAD 83.
 SY5644
 SY5644.The geoid height was determined by GEOID96.
 SY5644
 SY5644.The dynamic height is computed by dividing the NAVD 88
 SY5644.geopotential number by the normal gravity value computed on the
 SY5644.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 SY5644.degrees latitude (G = 980.6199 gals.).
 SY5644
 SY5644.The modeled gravity was interpolated from observed gravity values.
 SY5644
 SY5644;                    North         East     Units   Scale      Converg.
 SY5644;SPC WA S     -   216,822.066   236,150.839   MT  0.99997830 -2 31 54.5
 SY5644;UTM  10      - 5,231,364.241   425,406.426   MT  0.99966838 -0 43 24.4
 SY5644
 SY5644                          SUPERSEDED SURVEY CONTROL
 SY5644
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SY5644  ELLIP HT    -          13.19  (m)                      GP(       ) 4 1
SY5644  NGVD 29     -        35.48   (m)          116.4    (f) N HEIGHT    3
SY5644
SY5644.Superseded values are not recommended for survey control.
SY5644.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SY5644.See file dsdata.txt to determine how the superseded data were derived.
SY5644
SY5644_MARKER: DH = HORIZONTAL CONTROL DISK
SY5644_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
SY5644_STAMPING: HATCHERY 1990
SY5644_PROJECTION: FLUSH
SY5644_MAGNETIC: O = OTHER; SEE DESCRIPTION
SY5644_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SY5644+STABILITY: SURFACE MOTION
SY5644_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SY5644+SATELLITE: SATELLITE OBSERVATIONS - February 13, 1991
SY5644
SY5644  HISTORY     - Date     Condition        Recov. By
SY5644  HISTORY     - 1990     MONUMENTED       NGS
SY5644  HISTORY     - 19910213 GOOD
SY5644  HISTORY     - 19970721 GOOD             WADECO
SY5644
SY5644                          STATION DESCRIPTION
SY5644
SY5644'DESCRIBED BY NATIONAL GEODETIC SURVEY 1990
SY5644'THE STATION IS LOCATED ABOUT 66.0 KM (41.0 MI) WEST OF SHELTON, 29.0
SY5644'KM (18.0 MI) NORTH OF HOQUIAM, 27.4 KM (17.0 MI) SOUTH OF AMANDA PARK
SY5644'AND AT THE HUMPTULIPS STATE SALMON HATCHERY.
SY5644'TO REACH FROM THE POST OFFICE, AT THE JUNCTION OF US HIGHWAY 101 AND
SY5644'THE COPALIS CROSSING COUNTY ROAD IN HUMPTULIPS, GO WESTERLY ON THE
SY5644'COUNTY ROAD FOR 2.09 KM (1.30 MI) TO A SIDE ROAD LEFT, JUST BEFORE
SY5644'REACHING A BRIDGE.  TURN LEFT, PASS THROUGH THE GATE, IF IT IS CLOSED
SY5644'CHECK AT THE MAIN OFFICE OF THE HATCHERY, AND GO SOUTHERLY ON THE
SY5644'GRAVELED ROAD FOR 0.32 KM (0.20 MI) TO THE STATION ON THE RIGHT.
SY5644'THE MARK IS SET IN THE TOP OF A ROUND CONCRETE MONUMENT THAT IS FLUSH
SY5644'WITH THE GROUND SURFACE.  IT IS 15.7 M (51.5 FT) SOUTHWEST OF A POWER
SY5644'POLE, 7.4 M (24.3 FT) WEST OF THE NORTHEAST CORNER OF A PUMP HOUSE
SY5644'AND 2.7 M (8.9 FT) EAST OF A WITNESS POST.
SY5644
SY5644                          STATION RECOVERY (1991)
SY5644
SY5644'RECOVERED 1991
SY5644'RECOVERED IN GOOD CONDITION.
SY5644
SY5644                          STATION RECOVERY (1997)
SY5644
SY5644'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SY5644'RECOVERED AS DESCRIBED.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7005 ***********************************************************************
 AH7005  DESIGNATION -  HD 1
 AH7005  PID         -  AH7005
 AH7005  STATE/COUNTY-  WA/GRAYS HARBOR
 AH7005  USGS QUAD   -  POINT BROWN (1984)
 AH7005
 AH7005                         *CURRENT SURVEY CONTROL
 AH7005  ______________________________________________________________________
 AH7005* NAD 83(1991)-  46 54 09.88758(N)    124 07 52.12724(W)     ADJUSTED
 AH7005* NAVD 88     -         8.04   (meters)      26.4    (feet)  GPS OBS
 AH7005  ______________________________________________________________________
 AH7005  X           -  -2,449,477.604 (meters)                     COMP
 AH7005  Y           -  -3,613,630.341 (meters)                     COMP
 AH7005  Z           -   4,634,372.435 (meters)                     COMP
 AH7005  LAPLACE CORR-          11.78  (seconds)                    DEFLEC96
 AH7005  ELLIP HEIGHT-         -16.59  (meters)                     GPS OBS
 AH7005  GEOID HEIGHT-         -24.47  (meters)                     GEOID96
 AH7005
 AH7005  HORZ ORDER  -  FIRST
 AH7005  ELLP ORDER  -  THIRD     CLASS II
 AH7005
 AH7005.The horizontal coordinates were established by GPS observations
 AH7005.and adjusted by the National Geodetic Survey in January 1999.
 AH7005
 AH7005.The orthometric height was determined by GPS observations and a
 AH7005.high-resolution geoid model using precise GPS observation and
 AH7005.processing techniques.
 AH7005
 AH7005.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7005
 AH7005.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7005
 AH7005.The ellipsoidal height was determined by GPS observations
 AH7005.and is referenced to NAD 83.
 AH7005
 AH7005.The geoid height was determined by GEOID96.
 AH7005
 AH7005;                    North         East     Units   Scale      Converg.
 AH7005;SPC WA S     -   180,809.016   223,445.898   MT  0.99992995 -2 38 15.5
 AH7005;UTM  10      - 5,194,977.785   413,848.384   MT  0.99969122 -0 49 33.6
 AH7005
 AH7005                           SUPERSEDED SURVEY CONTROL
 AH7005
 AH7005.No superseded survey control is available for this station.
 AH7005
 AH7005_MARKER: A = ALUMINUM MARKER
 AH7005_SETTING: 17 = SET INTO TOP OF METAL PIPE DRIVEN INTO GROUND
 AH7005_STAMPING: HD 1
 AH7005_PROJECTION: FLUSH
 AH7005_MAGNETIC: O = OTHER; SEE DESCRIPTION
 AH7005_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AH7005+STABILITY: SURFACE MOTION
 AH7005_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7005+SATELLITE: SATELLITE OBSERVATIONS - 1988
 AH7005
 AH7005  HISTORY     - Date     Condition        Recov. By
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AH7005 HISTORY   - 1988   MONUMENTED   USE
AH7005
AH7005   STATION DESCRIPTION
AH7005
AH7005'DESCRIBED BY US ENGINEERS 1988
AH7005'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .
AH7005'THE STATION IS LOCATED IN THE CITY OF WESTPORT AT WESTHAVEN STATE
AH7005'PARK. FROM THE INTERSECTION OF SR 105 AND SR 105 SPUR GO NORTH ON 105
AH7005'SPUR TO OCEAN AVENUE. TURN RIGHT (EAST) AND FOLLOW OCEAN AVENUE TO
AH7005'MONTESANO AVENUE. TURN LEFT (NORTH) AND FOLLOW MONESANO AVENUE TO THE
AH7005'WESTHAVEN STATE PARK ACCESS ROAD ON LEFT. FOLLOW THE ACCESS ROAD WEST
AH7005'1.0 MILES (1.6 KM) TO BEACH ACCESS PARKING AREA AND WOOD FRAME
AH7005'RESTROOMS ON THE WEST SIDE OF LOT. THE STATION IS 28 M, (91.9 FT) 330
AH7005'DEGREES GRID, FROM THE NORTHWEST CORNER OF THE RESTROOMS, ABOUT 262 M
AH7005'(859.6 FT) SOUTH OF THE JETTY, AND 0.5 M (1.6 FT) SOUTH OF A 0.75 M
AH7005'(2.46 FT) TALL 4X4 WOOD WITNESS POST. THE STATION IS ABOUT 0.1 M (0.3
AH7005'FT) BELOW THE SURFACE IN SHIFTING SAND. THE STATION IS A ALUMINUM
AH7005'DISK ON A 3 INCH PIPE DRIVEN 10 FT. (3.0 M) THE DISK IS STAMPED HD 1
AH7005'1988.

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1        National Geodetic Survey,   Retrieval Date = FEBRUARY  3, 1999
 AH7028 ***********************************************************************
 AH7028  DESIGNATION -  IREDALE
 AH7028  PID         -  AH7028
 AH7028  STATE/COUNTY-  OR/CLATSOP
 AH7028  USGS QUAD   -  WARRENTON (1985)
 AH7028
 AH7028                         *CURRENT SURVEY CONTROL
 AH7028  ______________________________________________________________________
 AH7028* NAD 83(1991)-  46 10 40.11095(N)    123 58 42.18864(W)     ADJUSTED
 AH7028* NAVD 88     -         8.3    (meters)      27.     (feet)  GPS OBS
 AH7028  ______________________________________________________________________
 AH7028  X           -  -2,472,525.360 (meters)                     COMP
 AH7028  Y           -  -3,668,654.139 (meters)                     COMP
 AH7028  Z           -   4,578,943.469 (meters)                     COMP
 AH7028  LAPLACE CORR-          15.09  (seconds)                    DEFLEC96
 AH7028  ELLIP HEIGHT-         -15.52  (meters)                     GPS OBS
 AH7028  GEOID HEIGHT-         -23.72  (meters)                     GEOID96
 AH7028
 AH7028  HORZ ORDER  -  FIRST
 AH7028  ELLP ORDER  -  THIRD     CLASS II
 AH7028
 AH7028.The horizontal coordinates were established by GPS observations
 AH7028.and adjusted by the National Geodetic Survey in January 1999.
 AH7028
 AH7028.The orthometric height was determined by GPS observations.
 AH7028
 AH7028.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7028
 AH7028.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7028
 AH7028.The ellipsoidal height was determined by GPS observations
 AH7028.and is referenced to NAD 83.
 AH7028
 AH7028.The geoid height was determined by GEOID96.
 AH7028
 AH7028;                     North         East     Units   Scale      Converg.
 AH7028;SPC OR N     -   284,840.374 2,231,486.681   MT  1.00005009 -2 28 00.6
 AH7028;UTM  10      - 5,114,268.762   424,484.511   MT  0.99967010 -0 42 21.4
 AH7028
 AH7028                           SUPERSEDED SURVEY CONTROL
 AH7028
 AH7028.No superseded survey control is available for this station.
 AH7028
 AH7028_MARKER: I = METAL ROD
 AH7028_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 AH7028_STAMPING: IREDALE 1997
 AH7028_PROJECTION: RECESSED 10 CENTIMETERS
 AH7028_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
 AH7028_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7028+SATELLITE: SATELLITE OBSERVATIONS - 1997
 AH7028_ROD/PIPE-DEPTH: 10   meters
 AH7028
 AH7028  HISTORY     - Date     Condition        Recov. By
 AH7028  HISTORY     - 1997     MONUMENTED       NGS
 AH7028  HISTORY     - 1998     DESTROYED        WADECO
 AH7028
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AH7028 STATION DESCRIPTION
AH7028
AH7028'DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH7028'DESCRIBED BY THE WASINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .
AH7028'THE STATION IS IN FORT STEVENS STATE PARK NEAR THE PETER IREDALE SHIP
AH7028'WRECK AND WITHIN 150 M (492.1 FT) OF THE PACFIC OCEAN. TO REACH FROM
AH7028'WARRENTON TAKE US 101 SPUR TO 18TH STREET SW. FOLLOW 18TH STREET (AKA
AH7028'RIDGE ROAD) NORTHWEST TO THE SOUTH (CAMPING) ENTRANCE TO THE STATE
AH7028'PARK. FROM THIS INTERSECTION GO WEST ON PETER IREDALE ROAD THROUGH
AH7028'FLASHING RED LIGHTS AND CAMPGROUND. CONTINUE WEST, THEN NORTHWEST ON
AH7028'PETER IREDALE ROAD TO A 4 X 4 FT (1.2 M) SIGN TO THE PETER IREDALE
AH7028'SHIPWRECK. FOLLOW SIGNS TO THE PETER IREDALE SHIPWRECK PARKING AREAS.
AH7028'GO TO THE SOUTHERN MOST MARKING LOT WITH A WOOD FRAME BATHROOM ON THE
AH7028'NORTH SIDE OF LOT. THE STATION IS 28.5 M (93.5 FT) EAST (60 DEGREES
AH7028'GRID) OF THE SOUTHEAST CORNER OF THE CEMENT SLAB FOUNDATION OF THE
AH7028'BATHROOMS, 14.5 M (47.6 FT) NORTH OF THE CENTERLINE OF THE PARKING LOT
AH7028'ACCESS ROAD, 1 M (3.3 FT) SOUTH OF A ORANGE NGS WITNESS POST, AND 1.5
AH7028'M (4.9 FT) NORTHWEST OF A STEEL U-SHAPED PICKET THAT EXTENDS ABOUT 5
AH7028'FT (1.5 M) ABOVE THE GROUND. THE STATION IS 107 M (351.0 FT)
AH7028'SOUTHWEST (204 DEGREES GRID) OF A LONE TELEPHONE POLE (NO WIRES)
AH7028'LOCATED BY A 6 X 6 FT (1.8 M) OLD MILITARY GUARD HOUSE THAT IS LOCATED
AH7028'NORTH OF THE APPROACH ROAD TO THE PETER IREDALE SHIPWRECK. THE
AH7028'STATION IS A STAINLESS STEEL ROD DRIVEN 98 FT, (29.9 M) ACCESS TO THE
AH7028'DATUM POINT IS HAD THROUGH A 5-INCH STANDARD NGS LOGO CAP THAT IS
AH7028'STAMPED IREDALE 1997. RECOVERD AS DESCRIBED ON 12/4/1997. MARK WAS
AH7028'COVERED BY 1.5 FT (0.5 M) OF BLOWING SAND.
AH7028
AH7028 STATION RECOVERY (1998)
AH7028
AH7028'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1998 (RCD)
AH7028'REPORTED DESTROYED ON 6/31/1998 WITH TOP 2 FT (0.6 M) OF ROD BENT
AH7028'45 DEGREES TO THE WEST. STATION RESET ON 7/15/1998. TOP SECTION OF
AH7028'STAINLESS STEEL ROD AND COVER REPLACED. NEW STANDARD NGS LOGO COVER IS
AH7028'STAMPED IREDALE 1997 1998 (SEE AH8187).

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH8187 ***********************************************************************
 AH8187  DESIGNATION -  IREDALE RESET
 AH8187  PID         -  AH8187
 AH8187  STATE/COUNTY-  OR/CLATSOP
 AH8187  USGS QUAD   -  WARRENTON (1985)
 AH8187
 AH8187                         *CURRENT SURVEY CONTROL
 AH8187  ______________________________________________________________________
 AH8187* NAD 83(1991)-  46 10 40.11162(N)    123 58 42.18851(W)     ADJUSTED
 AH8187* NAVD 88     -         8.6    (meters)      28.     (feet)  GPS OBS
 AH8187  ______________________________________________________________________
 AH8187  X           -  -2,472,525.445 (meters)                     COMP
 AH8187  Y           -  -3,668,654.270 (meters)                     COMP
 AH8187  Z           -   4,578,943.663 (meters)                     COMP
 AH8187  LAPLACE CORR-          15.09  (seconds)                    DEFLEC96
 AH8187  ELLIP HEIGHT-         -15.27  (meters)                     GPS OBS
 AH8187  GEOID HEIGHT-         -23.72  (meters)                     GEOID96
 AH8187
 AH8187  HORZ ORDER  -  FIRST
 AH8187  ELLP ORDER  -  FOURTH    CLASS II
 AH8187
 AH8187.The horizontal coordinates were established by GPS observations
 AH8187.and adjusted by the National Geodetic Survey in March 1999.
 AH8187
 AH8187.The orthometric height was determined by GPS observations.
 AH8187
 AH8187.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH8187
 AH8187.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH8187
 AH8187.The ellipsoidal height was determined by GPS observations
 AH8187.and is referenced to NAD 83.
 AH8187
 AH8187.The geoid height was determined by GEOID96.
 AH8187
 AH8187;                     North         East     Units   Scale      Converg.
 AH8187;SPC OR N     -   284,840.395 2,231,486.685   MT  1.00005009 -2 28 00.6
 AH8187;UTM  10      - 5,114,268.782   424,484.514   MT  0.99967010 -0 42 21.4
 AH8187
 AH8187                           SUPERSEDED SURVEY CONTROL
 AH8187
 AH8187.No superseded survey control is available for this station.
 AH8187
 AH8187_MARKER: I = METAL ROD
 AH8187_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 AH8187_STAMPING: IREDALE 1997 1998
 AH8187_PROJECTION: RECESSED 10 CENTIMETERS
 AH8187_MAGNETIC: I = MARKER IS A STEEL ROD
 AH8187_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
 AH8187_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH8187+SATELLITE: SATELLITE OBSERVATIONS - 1998
 AH8187_ROD/PIPE-DEPTH: 30.0 meters
 AH8187
 AH8187  HISTORY     - Date     Condition        Recov. By
 AH8187  HISTORY     - 1998     MONUMENTED       WADOE
 AH8187
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AH8187 STATION DESCRIPTION
AH8187
AH8187'DESCRIBED BY WA STATE DEPT ECOLOGY 1998 (RCD)
AH8187'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1998 (RCD)
AH8187'REPLACES STATION IREDALE 1997 THAT WAS DESTROYED. STATION RESET AT
AH8187'THE SAME LOCATION ON 07/15/1998. NEW DESCRIPTION FOLLOWS. THE
AH8187'STATION IS IN FORT STEVENS STATE PARK NEAR THE PETER IREDALE SHIP
AH8187'WRECK AND WITHIN 150 M (492.1 FT) OF THE PACFIC OCEAN. TO REACH FROM
AH8187'WARRENTON TAKE US 101 SPUR TO 18TH STREET SW. FOLLOW 18TH STREET (AKA
AH8187'RIDGE ROAD) NORTHWEST TO THE SOUTH (CAMPING) ENTRANCE TO THE STATE
AH8187'PARK. FROM THIS INTERSECTION GO WEST ON PETER IREDALE ROAD THROUGH
AH8187'FLASHING RED LIGHTS AND CAMPGROUND. CONTINUE WEST, THEN NORTHWEST ON
AH8187'PETER IREDALE ROAD TO A 4 X 4 FT (1.2 M) SIGN TO THE PETER IREDALE
AH8187'SHIPWRECK. FOLLOW SIGNS TO THE PETER IREDALE SHIPWRECK PARKING AREAS.
AH8187'GO TO THE SOUTHERN MOST MARKING LOT WITH A WOOD FRAME BATHROOM ON THE
AH8187'NORTH SIDE OF LOT. THE STATION IS 28.5 M (93.5 FT) EAST (60 DEGREES
AH8187'GRID) OF THE SOUTHEAST CORNER OF THE CEMENT SLAB FOUNDATION OF THE
AH8187'BATHROOMS, 14.5 M (47.6 FT) NORTH OF THE CENTERLINE OF THE PARKING LOT
AH8187'ACCESS ROAD. STATION IS CENTERED BETWEEN FOUR ORANGE WITNESS POSTS
AH8187'THAT ARE 1 M (3.3 FT) NORTH, EAST, WEST, AND SOUTH OF THE STATION. A
AH8187'STEEL U-SHAPED PICKET THAT EXTENDS ABOUT 5 FT (1.5 M) ABOVE THE GROUND
AH8187'IS 1.5 M (4.9 FT) SOUTHWEST OF THE STATION. THE STATION IS 107 M
AH8187'(351.0 FT) SOUTHWEST (204 DEGREES GRID) OF A LONE TELEPHONE POLE (NO
AH8187'WIRES) LOCATED BY A 6 X 6 FT (1.8 M) OLD MILITARY GUARD HOUSE THAT IS
AH8187'LOCATED NORTH OF THE APPROACH ROAD TO THE PETER IREDALE SHIPWRECK.
AH8187'THE STATION IS A STAINLESS STEEL ROD DRIVEN 99 FT, (30.2 M) ACCESS TO
AH8187'THE DATUM POINT IS HAD THROUGH A 5-INCH STANDARD NGS LOGO CAP THAT IS
AH8187'STAMPED IREDALE 1997 1998. THE NGS LOGO COVER IS SET IN 300 LBS OF
AH8187'CONCRETE WITH REBAR. THE CAP IS 1 FT (0.3 M) BELOW GRADE AND THE
AH8187'CONCRETE EXTENDS 1.5 FT (0.5 M) FROM THE EDGE OF THE CAP. FOUR 1/2
AH8187'INCH REBAR FORM A SQUARE WITHIN THE CONCRETE AROUND THE LOGO CAP. THE
AH8187'ORIGINAL BENT SECTION OF ROD WAS REPLACEMENT WITH A NEW SECTION OF
AH8187'STAINLESS STEEL ROD THAT WAS 26.35 CM LONGER THAN THE ORIGINAL.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7029 ***********************************************************************
 AH7029  DESIGNATION -  KIM
 AH7029  PID         -  AH7029
 AH7029  STATE/COUNTY-  OR/CLATSOP
 AH7029  USGS QUAD   -  WARRENTON (1985)
 AH7029
 AH7029                        *CURRENT SURVEY CONTROL
 AH7029  ______________________________________________________________________
 AH7029* NAD 83(1991)-  46 09 00.63643(N)    123 57 21.76446(W)     ADJUSTED
 AH7029* NAVD 88     -        28.3    (meters)      93.     (feet)  GPS OBS
 AH7029  ______________________________________________________________________
 AH7029  X           -  -2,472,340.000 (meters)                     COMP
 AH7029  Y           -  -3,671,467.154 (meters)                     COMP
 AH7029  Z           -   4,576,830.763 (meters)                     COMP
 AH7029  LAPLACE CORR-          15.22  (seconds)                    DEFLEC96
 AH7029  ELLIP HEIGHT-           4.63  (meters)                     GPS OBS
 AH7029  GEOID HEIGHT-         -23.55  (meters)                     GEOID96
 AH7029
 AH7029  HORZ ORDER  -  FIRST
 AH7029  ELLP ORDER  -  THIRD     CLASS II
 AH7029
 AH7029.The horizontal coordinates were established by GPS observations
 AH7029.and adjusted by the National Geodetic Survey in January 1999.
 AH7029
 AH7029.The orthometric height was determined by GPS observations.
 AH7029
 AH7029.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7029
 AH7029.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7029
 AH7029.The ellipsoidal height was determined by GPS observations
 AH7029.and is referenced to NAD 83.
 AH7029
 AH7029.The geoid height was determined by GEOID96.
 AH7029
 AH7029;                     North         East     Units   Scale      Converg.
 AH7029;SPC OR N     -   281,697.632 2,233,078.808   MT  1.00004167 -2 27 03.5
 AH7029;UTM  10      - 5,111,177.603   426,171.837   MT  0.99966700 -0 41 22.2
 AH7029
 AH7029                           SUPERSEDED SURVEY CONTROL
 AH7029
 AH7029.No superseded survey control is available for this station.
 AH7029
 AH7029_MARKER: DH = HORIZONTAL CONTROL DISK
 AH7029_SETTING: 36 = ROOF OF CONCRETE BUNKER
 AH7029_STAMPING: KIM 1997
 AH7029_PROJECTION: FLUSH
 AH7029_MAGNETIC: O = OTHER; SEE DESCRIPTION
 AH7029_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
 AH7029_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7029+SATELLITE: SATELLITE OBSERVATIONS - September 29, 1998
 AH7029
 AH7029  HISTORY     - Date     Condition        Recov. By
 AH7029  HISTORY     - 1997     MONUMENTED       NGS
 AH7029  HISTORY     - 19980929 GOOD             WADOE
 AH7029
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AH7029 STATION DESCRIPTION
AH7029
AH7029'DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH7029'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .
AH7029'THE STATION IS AT THE NORTHERN BOUNDARY OF CAMP RILEA NATIONAL GUARD
AH7029'BASE. FROM WARRENTON CITY HIGH SCHOOL GO WEST ON SOUTH MAIN STREET/US
AH7029'101 SPUR TO INTERSECTION OF US 101 SPUR AND 18TH STREET SW/OCEANVIEW
AH7029'CEMETERY ROAD. GO NORTH ON 18TH STREET 1.75 MILES (2.82 KM) TO A Y
AH7029'INTERSECTION. CONTINUE ABOUT 15 M (49.2 FT) FURTHER NORTH AND TURN
AH7029'LEFT (WEST) ONTO DELAURA BEACH ROAD. GO WEST ON DELAURA BEACH ROAD TO
AH7029'A T INTERSECTION WITH PINE ROAD SW. CONTINUE WEST 375 M (1230.3 FT)
AH7029'ON DELAURA BEACH ROAD TO A GRAVEL OR SAND PIT WITH TWO CLATSOP COUNTY
AH7029'WITNESS POSTS ON RIGHT AND 3 FT (0.9 M) BELOW GRADE. THE STATION IS
AH7029'65 M (213.3 FT) SOUTH OF THE ROAD ON A TALL PARTIALLY WOODED DUNE, 18
AH7029'M (59.1 FT) NORTH OF THE CAMP RILEA BOUNDARY FENCE, IN THE CENTER OF
AH7029'THE ROOF OF A 4 X 4 M (13.1 FT) CONCRETE OBSERVATION POST. A SECOND
AH7029'AND LARGER OBSERVATION POST IS LOCATED SOUTH OF THE STATION. THIS
AH7029'SECOND BUNKER LIES SOUTH OF THE CAMP RILEA BOUNDARY FENCE. NGS
AH7029'STATION GALENA RM 2 LIES 111 M (364.2 FT) SOUTH AND 7 M (23.0 FT) EAST
AH7029'OF STATION KIM AND WILL SERVE AS A REFERENE MARK. THE STATION IS A
AH7029'STANDARD NATIONAL OCEAN SERVICE HORIZONTAL CONTROL MARK STAMPED KIM
AH7029'1997. THE DISK IS CEMENTED 10 CM EAST OF THE CENTER OF THE ROOF.
AH7029
AH7029 STATION RECOVERY (1998)
AH7029
AH7029'RECOVERY NOTE BY WA STATE DEPT ECOLOGY 1998 (RCD)
AH7029'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .
AH7029'THE STATION IS AT THE NORTHERN BOUNDARY OF CAMP RILEA NATIONAL GUARD
AH7029'BASE. FROM WARRENTON CITY HIGH SCHOOL GO WEST ON SOUTH MAIN STREET/US
AH7029'101 SPUR TO INTERSECTION OF US 101 SPUR AND 18TH STREET SW/OCEANVIEW
AH7029'CEMETERY ROAD. GO NORTH ON 18TH STREET 1.75 MILES (2.82 KM) TO A Y
AH7029'INTERSECTION. CONTINUE ABOUT 15 M (49.2 FT) FURTHER NORTH AND TURN
AH7029'LEFT (WEST) ONTO DELAURA BEACH ROAD. GO WEST ON DELAURA BEACH ROAD TO
AH7029'A T INTERSECTION WITH PINE ROAD SW. CONTINUE WEST 375 M (1230.3 FT)
AH7029'ON DELAURA BEACH ROAD TO A GRAVEL OR SAND PIT WITH TWO CLATSOP COUNTY
AH7029'WITNESS POSTS ON RIGHT AND 3 FT (0.9 M) BELOW GRADE. THE STATION IS
AH7029'65 M (213.3 FT) SOUTH OF THE ROAD ON A TALL PARTIALLY WOODED DUNE, 18
AH7029'M (59.1 FT) NORTH OF THE CAMP RILEA BOUNDARY FENCE, IN THE CENTER OF
AH7029'THE ROOF OF A 4 X 4 M (13.1 FT) CONCRETE OBSERVATION POST. A SECOND
AH7029'AND LARGER OBSERVATION POST IS LOCATED SOUTH OF THE STATION. THIS
AH7029'SECOND BUNKER LIES SOUTH OF THE CAMP RILEA BOUNDARY FENCE. NGS
AH7029'STATION GALENA RM 2 LIES 111 M (364.2 FT) SOUTH AND 7 M (23.0 FT) EAST
AH7029'OF STATION KIM AND WILL SERVE AS A REFERENE MARK. THE STATION IS A
AH7029'STANDARD NATIONAL OCEAN SERVICE HORIZONTAL CONTROL MARK STAMPED KIM
AH7029'1997. THE DISK IS CEMENTED 10 CM EAST OF THE CENTER OF THE ROOF.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0560 ***********************************************************************
 SD0560  DESIGNATION -  KLIPSAN 2 1976
 SD0560  PID         -  SD0560
 SD0560  STATE/COUNTY-  WA/PACIFIC
 SD0560  USGS QUAD   -  OCEAN PARK (1985)
 SD0560
 SD0560                        *CURRENT SURVEY CONTROL
 SD0560  ______________________________________________________________________
 SD0560* NAD 83(1991)-  46 27 52.29937(N)    124 03 22.95865(W)     ADJUSTED
 SD0560* NAVD 88     -         8.85   (meters)      29.0    (feet)  GPS OBS
 SD0560  ______________________________________________________________________
 SD0560  X           -  -2,464,608.860 (meters)                     COMP
 SD0560  Y           -  -3,646,188.740 (meters)                     COMP
 SD0560  Z           -   4,600,954.030 (meters)                     COMP
 SD0560  LAPLACE CORR-          16.16  (seconds)                    DEFLEC96
 SD0560  ELLIP HEIGHT-         -15.46  (meters)                     GPS OBS
 SD0560  GEOID HEIGHT-         -24.16  (meters)                     GEOID96
 SD0560
 SD0560  HORZ ORDER  -  FIRST
 SD0560  ELLP ORDER  -  THIRD     CLASS II
 SD0560
 SD0560.The horizontal coordinates were established by GPS observations
 SD0560.and adjusted by the National Geodetic Survey in January 1999.
 SD0560
 SD0560.The orthometric height was determined by GPS observations and a
 SD0560.high-resolution geoid model using precise GPS observation and
 SD0560.processing techniques.
 SD0560
 SD0560.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0560
 SD0560.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0560
 SD0560.The ellipsoidal height was determined by GPS observations
 SD0560.and is referenced to NAD 83.
 SD0560
 SD0560.The geoid height was determined by GEOID96.
 SD0560
 SD0560;                    North         East     Units   Scale      Converg.
 SD0560;SPC WA S     -   131,888.571   226,941.030   MT  0.99991680 -2 35 00.0
 SD0560;UTM  10      - 5,146,203.894   418,889.697   MT  0.99968087 -0 45 57.1
 SD0560
 SD0560:                Primary Azimuth Mark                    Grid Az
 SD0560:SPC WA S     -  024                                     184 33 02.7
 SD0560:UTM  10      -  024                                     182 43 59.8
 SD0560
 SD0560|---------------------------------------------------------------------|
 SD0560| PID    Reference Object                    Distance      Geod. Az   |
 SD0560|                                                          dddmmss.s  |
 SD0560| SD0566 KLIPSAN 2 1976 RM 2                  30.885 METERS 02821      |
 SD0560| SD0553 KLIPSAN                              54.487 METERS 09538      |
 SD0560| SD0565 KLIPSAN 2 1976 RM 3                  21.061 METERS 13436      |
 SD0560| SD0568 024                                 APPROX. 0.7 KM 1815802.7  |
 SD0560| SD0604 NORTH HEAD LH                       APPROX.18.5 KM 1850958.1  |
 SD0560| SD0567 026                                 494.179 METERS 3592530.7  |
 SD0560|---------------------------------------------------------------------|
 SD0560
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SD0560                          SUPERSEDED SURVEY CONTROL
SD0560
SD0560  NAD 83(1991)-  46 27 52.29500(N)    124 03 22.96162(W) AD(       ) 2
SD0560  NAD 83(1991)-  46 27 52.29418(N)    124 03 22.96117(W) AD(       ) 2
SD0560  NAD 83(1986)-  46 27 52.29457(N)    124 03 22.94053(W) AD(       ) 2
SD0560  NAD 27      -  46 27 52.94401(N)    124 03 18.35683(W) AD(       ) 2
SD0560  NGVD 29     -         8.4    (m)           28.     (f) VERT ANG
SD0560
SD0560.Superseded values are not recommended for survey control.
SD0560.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0560.See file dsdata.txt to determine how the superseded data were derived.
SD0560
SD0560_MARKER: DS = TRIANGULATION STATION DISK
SD0560_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
SD0560_STAMPING: KLIPSAN 2 1976
SD0560_PROJECTION: FLUSH
SD0560_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0560_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0560+STABILITY: SURFACE MOTION
SD0560
SD0560  HISTORY     - Date     Condition        Recov. By
SD0560  HISTORY     - 1976     MONUMENTED       NGS
SD0560  HISTORY     - 1981     GOOD             NOS
SD0560  HISTORY     - 19971015 GOOD             WADECO
SD0560
SD0560                          STATION DESCRIPTION
SD0560
SD0560'DESCRIBED BY NATIONAL GEODETIC SURVEY 1976 (CLN)
SD0560'THIS STATION WAS ESTABLISHED TO REPLACE KLIPSAN 1926 WHICH HAS VERY
SD0560'LIMITED LINES OF SIGHT.
SD0560'
SD0560'THE STATION IS ON THE WESTERN SIDE OF NORTH BEACH PENINSULA ABOUT 7
SD0560'MILES NORTH OF LONG BEACH, 2 MILES SOUTH OF OCEAN PARK IN THE LOCAL
SD0560'AREA CALLED KLIPSAN BEACH AND IN SECTION 4, T 11 N, R 11 W.
SD0560'
SD0560'TO REACH THE STATION FROM THE INTERSECTION OF SR103 AND BAY AVE.
SD0560'LOCATED 1/2 BLOCK EAST FROM THE POST OFFICE, GO SOUTH ON SR 103 FOR
SD0560'1.85 MILE TO A BLACK TOP ROAD TO THE RIGHT AND A SIGN TO BEACH IN
SD0560'KLIPSAN BEACH.  TURN RIGHT AND GO WEST 0.1 MILE TO A POWER LINE
SD0560'CROSSING THE ROAD AND A LOW SHED TYPE ROOFED HOUSE WITH THE NAME
SD0560'AVERY ABOUT 150 FEET SOUTH OF THE ROAD.  STATION IS LOCATED
SD0560'WEST-SOUTHWEST 199.6 FEET FROM THE NORTHWEST CORNER OF THE
SD0560'AVERY HOUSE.
SD0560'
SD0560'THE STATION MARK, STAMPED KLIPSAN 2 1976 IS A STANDARD DISK SET IN A
SD0560'10 INCH DIAMETER CONCRETE POST FLUSH WITH THE SURFACE.  A WITNESS
SD0560'POST WAS SET 4 FEET WEST OF THE STATION.
SD0560'
SD0560'THE SUBSURFACE MARK IS A STANDARD DISK STAMPED KLIPSAN 2 1976 SET IN
SD0560'A MASS OF CONCRETE 4 FEET BELOW THE SURFACE.
SD0560'
SD0560'REFERENCE MARK NO. 2 IS A STANDARD DISK STAMPED KLIPSAN 2 1976 NO. 2
SD0560'SET IN A 8 INCH DIAMETER CONCRETE MONUMENT PROJECTING 4 INCHES ABOVE
SD0560'GROUND SURFACE.
SD0560'
SD0560'REFERENCE MARK NO. 3 IS A STANDARD DISK STAMPED KLIPSAN 2 1976 NO. 3
SD0560'SET IN A 8 INCH DIAMETER CONCRETE MONUMENT PROJECTING 6 INCHES ABOVE
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SD0560'THE GROUND SURFACE AND LOCATED SOUTH OF THE AVERY HOUSE.
SD0560'
SD0560'STATION 024 IS A PACIFIC COUNTY BRASS DISK SET IN 10 INCH DIAMETER
SD0560'CONCRETE MONUMENT ON THE WESTERLY MOST SAND DUNE LOCATED .43 MILE
SD0560'SOUTH FROM THE STATION.
SD0560'
SD0560'NEAREST TOWN--OCEAN PARK.
SD0560
SD0560 STATION RECOVERY (1981)
SD0560
SD0560'RECOVERY NOTE BY NATIONAL OCEAN SURVEY 1981 (RBM)
SD0560'THE STATION AND REFERENCE MARK 3 WERE RECOVERED IN GOOD CONDITION
SD0560'REFERENCE MARK 2 WAS NOT FOUND AFTER A BRIEF SEARCH.
SD0560
SD0560 STATION RECOVERY (1997)
SD0560
SD0560'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0560'RECOVERED AS DESCRIBED. TO REACH FROM THE INTERSECTION OF SR 103 AND
SD0560'BAY AVENUE IN THE CITY OF OCEAN PARK GO SOUTH ON SR 103 FOR 1.85 MILES
SD0560'(2.98 KM) TO 225 STREET AND SIGN TO BEACH (KLIPSAN BEACH) . TURN WEST
SD0560'AND FOLLOW ROAD 0.1 MILES (0.2 KM) TO A POWER LINE AND A LOW SHED TYPE
SD0560'ROOFED HOUSE ABOUT 150 FT (45.7 M) SOUTH OF THE ROAD. THE STATION IS
SD0560'199.6 FT (60.8 M) WEST-SOUTHWEST FROM THE NORTHWEST CORNER OF THE
SD0560'HOUSE.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0129 ***********************************************************************
 SD0129  DESIGNATION -  L 443
 SD0129  PID         -  SD0129
 SD0129  STATE/COUNTY-  WA/GRAYS HARBOR
 SD0129  USGS QUAD   -  SHALE SLOUGH (1982)
 SD0129
 SD0129                         *CURRENT SURVEY CONTROL
 SD0129  ______________________________________________________________________
 SD0129* NAD 83(1991)-  47 17 03.88672(N)    124 14 02.09252(W)     ADJUSTED
 SD0129* NAVD 88     -         6.857  (meters)      22.50   (feet)  ADJUSTED
 SD0129  ______________________________________________________________________
 SD0129  X           -  -2,438,470.655 (meters)                     COMP
 SD0129  Y           -  -3,583,536.016 (meters)                     COMP
 SD0129  Z           -   4,663,258.735 (meters)                     COMP
 SD0129  LAPLACE CORR-           8.25  (seconds)                    DEFLEC96
 SD0129  ELLIP HEIGHT-         -17.46  (meters)                     GPS OBS
 SD0129  GEOID HEIGHT-         -24.11  (meters)                     GEOID96
 SD0129  DYNAMIC HT  -           6.858 (meters)      22.50  (feet)  COMP
 SD0129  MODELED GRAV-     980,764.3   (mgal)                       NAVD 88
 SD0129
 SD0129  HORZ ORDER  -  FIRST
 SD0129  VERT ORDER  -  SECOND    CLASS I
 SD0129  ELLP ORDER  -  THIRD     CLASS II
 SD0129
 SD0129.The horizontal coordinates were established by GPS observations
 SD0129.and adjusted by the National Geodetic Survey in January 1999.
 SD0129
 SD0129.The orthometric height was determined by differential leveling
 SD0129.and adjusted by the National Geodetic Survey in June 1991.
 SD0129
 SD0129.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0129
 SD0129.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0129
 SD0129.The ellipsoidal height was determined by GPS observations
 SD0129.and is referenced to NAD 83.
 SD0129
 SD0129.The geoid height was determined by GEOID96.
 SD0129
 SD0129.The dynamic height is computed by dividing the NAVD 88
 SD0129.geopotential number by the normal gravity value computed on the
 SD0129.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 SD0129.degrees latitude (G = 980.6199 gals.).
 SD0129
 SD0129.The modeled gravity was interpolated from observed gravity values.
 SD0129
 SD0129;                    North         East     Units   Scale      Converg.
 SD0129;SPC WA S     -   223,555.901   217,632.452   MT  0.99998917 -2 42 44.3
 SD0129;UTM  10      - 5,237,508.957   406,690.462   MT  0.99970700 -0 54 24.0
 SD0129
 SD0129                           SUPERSEDED SURVEY CONTROL
 SD0129
 SD0129  NGVD 29     -         5.836  (m)           19.15   (f) ADJ UNCH    2 1
 SD0129
 SD0129.Superseded values are not recommended for survey control.
 SD0129.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
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SD0129.See file dsdata.txt to determine how the superseded data were derived.
SD0129
SD0129_MARKER: DV = VERTICAL CONTROL DISK
SD0129_SETTING: 30 = BRIDGE ABUTMENT
SD0129_STAMPING: L 443 1977
SD0129_PROJECTION: FLUSH
SD0129_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0129_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0129+STABILITY: SURFACE MOTION
SD0129
SD0129  HISTORY     - Date     Condition        Recov. By
SD0129  HISTORY     - 1977     MONUMENTED       NGS
SD0129  HISTORY     - 1987     GOOD             USPSQD
SD0129  HISTORY     - 19971015 GOOD             WADECO
SD0129
SD0129                          STATION DESCRIPTION
SD0129
SD0129'DESCRIBED BY NATIONAL GEODETIC SURVEY 1977
SD0129'4.1 MI NORTH FROM MOCLIPS.
SD0129'4.05 MILES NORTH ALONG STATE HIGHWAY 109 FROM THE POST OFFICE AT
SD0129'MOCLIPS, IN THE TOP OF THE WEST CURB OF A BRIDGE OVER WRECK CREEK,
SD0129'1.3 FT NORTH OF THE SOUTH END AND 14.5 FT WEST OF THE CENTER LINE
SD0129'OF THE HIGHWAY.
SD0129
SD0129                          STATION RECOVERY (1987)
SD0129
SD0129'RECOVERY NOTE BY US POWER SQUADRON 1987 (EEM)
SD0129'RECOVERED IN GOOD CONDITION.
SD0129
SD0129                          STATION RECOVERY (1997)
SD0129
SD0129'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0129'RECOVERED AS DESCRIBED.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7014 ***********************************************************************
 AH7014  DESIGNATION -  LB 1
 AH7014  PID         -  AH7014
 AH7014  STATE/COUNTY-  WA/PACIFIC
 AH7014  USGS QUAD   -  NORTH COVE (1985)
 AH7014
 AH7014                         *CURRENT SURVEY CONTROL
 AH7014  ______________________________________________________________________
 AH7014* NAD 83(1991)-  46 39 00.22195(N)    124 03 43.34887(W)     ADJUSTED
 AH7014* NAVD 88     -         3.88   (meters)      12.7    (feet)  GPS OBS
 AH7014  ______________________________________________________________________
 AH7014  X           -  -2,456,580.291 (meters)                     COMP
 AH7014  Y           -  -3,633,536.885 (meters)                     COMP
 AH7014  Z           -   4,615,132.299 (meters)                     COMP
 AH7014  LAPLACE CORR-          15.17  (seconds)                    DEFLEC96
 AH7014  ELLIP HEIGHT-         -20.41  (meters)                     GPS OBS
 AH7014  GEOID HEIGHT-         -24.16  (meters)                     GEOID96
 AH7014
 AH7014  HORZ ORDER  -  FIRST
 AH7014  ELLP ORDER  -  THIRD     CLASS II
 AH7014
 AH7014.The horizontal coordinates were established by GPS observations
 AH7014.and adjusted by the National Geodetic Survey in January 1999.
 AH7014
 AH7014.The orthometric height was determined by GPS observations and a
 AH7014.high-resolution geoid model using precise GPS observation and
 AH7014.processing techniques.
 AH7014
 AH7014.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7014
 AH7014.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7014
 AH7014.The ellipsoidal height was determined by GPS observations
 AH7014.and is referenced to NAD 83.
 AH7014
 AH7014.The geoid height was determined by GEOID96.
 AH7014
 AH7014;                    North         East     Units   Scale      Converg.
 AH7014;SPC WA S     -   152,509.793   227,437.439   MT  0.99991524 -2 35 14.8
 AH7014;UTM  10      - 5,166,825.659   418,732.301   MT  0.99968118 -0 46 20.4
 AH7014
 AH7014                           SUPERSEDED SURVEY CONTROL
 AH7014
 AH7014.No superseded survey control is available for this station.
 AH7014
 AH7014_MARKER: I = METAL ROD
 AH7014_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 AH7014_STAMPING: LB 1 1997
 AH7014_PROJECTION: RECESSED 10 CENTIMETERS
 AH7014_MAGNETIC: I = MARKER IS A STEEL ROD
 AH7014_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
 AH7014_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7014+SATELLITE: SATELLITE OBSERVATIONS - 1997
 AH7014_ROD/PIPE-DEPTH: 10   meters
 AH7014
 AH7014  HISTORY     - Date     Condition        Recov. By
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AH7014 HISTORY   - 1997   MONUMENTED   NGS
AH7014
AH7014   STATION DESCRIPTION
AH7014
AH7014'DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH7014'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .
AH7014'THE STATION IS LOCATED IN THE WILLAPA BAY WILDLIFE REFUGE AT THE
AH7014'EXTREME NORTH END OF LEADBETTER POINT IN PARTIALLY VEGETATED AND
AH7014'SHIFTING SAND DUNES. FROM OYSTERVILLE FOLLOW OYSTERVILLE ROAD WEST
AH7014'ABOUT 1.5 MILES (2.4 KM) TO A BEACH ACCESS. FROM THE BEACH ACCESS
AH7014'DRIVE NORTH (4WD REQUIRED) ON BEACH FOR 7.4 MILES. (11.9 KM) PARK
AH7014'VEHICLE ABOVE THE HIGH TIDE LINE. THE STATION IS ON A PARTIALLY
AH7014'VEGETATED DUNE LOCATED 340 M (1115.5 FT) EAST (135 DEGREES GRID) FROM
AH7014'THE MEAN HIGH WATER LINE AND CENTERED BETWEEN TWO ORANGE NGS WITNESS
AH7014'POSTS (TIDE RANGE WAS -1.4 TO 9.0 FT (2.7 M) WHEN STATION WAS
AH7014'INSTALLED) . THE POSTS ARE 2 M (6.6 FT) EAST AND 2 M (6.6 FT) WEST OF
AH7014'THE STATION. A REFERENCE MARK IS LOCATED 75 M (246.1 FT) WEST OF THE
AH7014'STATION. THE REFERENCE MARK IS 263 M (862.9 FT) EAST (140 DEGREES
AH7014'GRID) FROM THE MEAN HIGH WATER LINE. THE STATION IS 75 M (246.1 FT)
AH7014'EAST (125 DEGREES GRID) OF THE REFERENCE MARK. THE REFERENCE MARK IS
AH7014'A STAINLESS STEEL BOLT WITH DATUM POINT ATTACHED TO A STAINLESS STEEL
AH7014'ROD DRIVEN 8 FT. (2.4 M) THE ROD IS CEMENTED IN PLACE BY 60 LBS OF
AH7014'CONCRETE. A ORANGE NGS WITNESS POST IS 1 M (3.3 FT) EAST OF THE MARK
AH7014'AND EXTENDS 0.6 M (2.0 FT) ABOVE THE SURFACE AND THE MARK. AN ARROW
AH7014'DRAWN IN THE CONCRETE POINTS TOWARD THE STATION. THE STATION IS A
AH7014'STAINLESS STEEL ROD DRIVEN 134 FT. (40.8 M) ACCESS TO THE DATUM POINT
AH7014'IS HAD THROUGH A 5-INCH STANDARD NGS LOGO CAP THAT IS STAMPED LB 1
AH7014'1997. THE LOGO CAP IS FLUSH WITH THE SURFACE.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0536 ***********************************************************************
 SD0536  DESIGNATION -  LIME 2
 SD0536  PID         -  SD0536
 SD0536  STATE/COUNTY-  WA/PACIFIC
 SD0536  USGS QUAD   -  OCEAN PARK (1985)
 SD0536
 SD0536                         *CURRENT SURVEY CONTROL
 SD0536  ______________________________________________________________________
 SD0536* NAD 83(1991)-  46 24 36.18854(N)    124 01 04.10478(W)     ADJUSTED
 SD0536* NAVD 88     -         3.32   (meters)      10.9    (feet)  GPS OBS
 SD0536  ______________________________________________________________________
 SD0536  X           -  -2,464,606.510 (meters)                     COMP
 SD0536  Y           -  -3,651,480.974 (meters)                     COMP
 SD0536  Z           -   4,596,777.078 (meters)                     COMP
 SD0536  LAPLACE CORR-          16.08  (seconds)                    DEFLEC96
 SD0536  ELLIP HEIGHT-         -20.78  (meters)                     GPS OBS
 SD0536  GEOID HEIGHT-         -23.95  (meters)                     GEOID96
 SD0536
 SD0536  HORZ ORDER  -  FIRST
 SD0536  ELLP ORDER  -  THIRD     CLASS II
 SD0536
 SD0536.The horizontal coordinates were established by GPS observations
 SD0536.and adjusted by the National Geodetic Survey in January 1999.
 SD0536
 SD0536.The orthometric height was determined by GPS observations and a
 SD0536.high-resolution geoid model using precise GPS observation and
 SD0536.processing techniques.
 SD0536
 SD0536.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0536
 SD0536.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0536
 SD0536.The ellipsoidal height was determined by GPS observations
 SD0536.and is referenced to NAD 83.
 SD0536
 SD0536.The geoid height was determined by GEOID96.
 SD0536
 SD0536;                    North         East     Units   Scale      Converg.
 SD0536;SPC WA S     -   125,706.828   229,630.549   MT  0.99991924 -2 33 19.2
 SD0536;UTM  10      - 5,140,112.038   421,773.262   MT  0.99967522 -0 44 14.0
 SD0536
 SD0536:                Primary Azimuth Mark                    Grid Az
 SD0536:SPC WA S     -  SNAKE 2                                 358 27 50.6
 SD0536:UTM  10      -  SNAKE 2                                 356 38 45.4
 SD0536
 SD0536|----------------------------------------------------------------------|
 SD0536| PID    Reference Object                    Distance      Geod. Az   |
 SD0536|                                                          dddmmss.s  |
 SD0536| SD0548 LIME                                23.615 METERS 10502      |
 SD0536|        LIME RM 2                            8.653 METERS 22527      |
 SD0536|        TWO INCH PIPE ON TANK                6.309 METERS 28713      |
 SD0536| SD0538 SNAKE 2                            APPROX. 3.0 KM 3555431.4  |
 SD0536|        LIME 2 RM 3                          26.265 METERS 35833      |
 SD0536|----------------------------------------------------------------------|
 SD0536
 SD0536                          SUPERSEDED SURVEY CONTROL
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SD0536
SD0536  NAD 83(1991)-  46 24 36.18648(N)    124 01 04.10396(W) AD(       ) 2
SD0536  NAD 83(1991)-  46 24 36.18611(N)    124 01 04.10349(W) AD(       ) 2
SD0536  NAD 83(1986)-  46 24 36.18835(N)    124 01 04.08255(W) AD(       ) 2
SD0536  NAD 27      -  46 24 36.82847(N)    124 00 59.50953(W) AD(       ) 2
SD0536  NGVD 29     -         2.8    (m)           9.     (f) VERT ANG
SD0536
SD0536.Superseded values are not recommended for survey control.
SD0536.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0536.See file dsdata.txt to determine how the superseded data were derived.
SD0536
SD0536_MARKER: DS = TRIANGULATION STATION DISK
SD0536_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
SD0536_STAMPING: LIME 2 1971
SD0536_PROJECTION: FLUSH
SD0536_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0536_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0536+STABILITY: SURFACE MOTION
SD0536
SD0536  HISTORY     - Date     Condition        Recov. By
SD0536  HISTORY     - 1971     MONUMENTED       NGS
SD0536  HISTORY     - 1977     MONUMENTED       NGS
SD0536  HISTORY     - 19971203 GOOD             WADECO
SD0536
SD0536                          STATION DESCRIPTION
SD0536
SD0536'DESCRIBED BY NATIONAL GEODETIC SURVEY 1971 (LFS)
SD0536'THIS STATION WAS ESTABLISHED TO REPLACE LIME 1938.
SD0536'
SD0536'THE STATION IS LOCATED ON NORTH BEACH PENINSULA, ON THE WEST SIDE
SD0536'OF SHOALWATER BAY, 5 MILES NORTH-NORTHEAST OF LONG BEACH, 4 MILES
SD0536'SOUTH-SOUTHEAST OF KLIPSAN BEACH, 1-3/4 MILES EAST OF OCEANSIDE
SD0536'AND IN SECTION 27, T 11 N, R 11 W, ON LAND OWNED BY MR. MEL
SD0536'STRATTON.
SD0536'
SD0536'TO REACH FROM THE NAHCOTTA STORE AND POST OFFICE IN NAHCOTTA, GO
SD0536'SOUTH ON THE BLACKTOP ROAD FOR 0.4 MILE TO THE INTERSECTION OF BAY
SD0536'ROAD AND PENINSULA ROAD, CONTINUE SOUTH ON PENINSULA ROAD FOR
SD0536'5.5 MILES TO LITSCHKE ROAD, CONTINUE SOUTH ON PENINSULA ROAD FOR
SD0536'0.25 MILE TO TWO DRIVEWAYS SEPARATED BY A FENCE.  TURN LEFT AND
SD0536'GO EAST ON THE SOUTHERN DRIVEWAY FOR 0.1 MILE TO MR. MEL
SD0536'STRATTONS HOUSE ON THE RIGHT AND A GATE ACROSS THE ROAD.
SD0536'CONTINUE STRAIGHT AHEAD THROUGH THE GATE FOR 0.1 MILE TO THE
SD0536'BEACH AND REFERENCE MARK NO. 3 ON THE LEFT AND THE STATION ON
SD0536'THE RIGHT, 75 FEET SOUTH OF THE CENTER OF THE ROAD.
SD0536'
SD0536'THE STATION MARK, STAMPED LIME 2 1971, IS A STANDARD DISK STAMPED
SD0536'LIME 2 1971, SET IN A ROUND CONCRETE POST FLUSH WITH THE GROUND,
SD0536'ON AN 18-INCH HIGH BANK, BUILT UP PRIMARILY OF OYSTER SHELLS, 22
SD0536'YARDS WEST OF THE HIGH WATER LINE, 14 FEET EAST OF THE WEST EDGE
SD0536'OF THE BANK AND 1.3 FEET SOUTH OF THE PROJECTED SOUTH SIDE OF
SD0536'THE CONCRETE TANK WHICH IS DESCRIBED BELOW.  UNDERGROUND MARK IS
SD0536'SET IN CONCRETE 2.5 FEET BELOW GROUND.
SD0536'
SD0536'REFERENCE MARK NO. 2, STAMPED LIME 1938 NO 2, IS A STANDARD DISK
SD0536'SET IN A 4-INCH SOIL PIPE WHICH PROJECTS 4 INCHES.  IT IS 26.0
SD0536'FEET SOUTH OF THE 2-INCH PIPE AND ON LINE WITH THE CENTER OF THE
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SD0536'CONCRETE TANK, 7 FEET EAST OF A FENCELINE AND ABOUT 1.5 FEET LOWER
SD0536'THAN THE STATION.
SD0536'
SD0536'REFERENCE MARK NO. 3, STAMPED LIME 2 NO 3 1971, IS A STANDARD
SD0536'DISK SET IN A ROUND CONCRETE POST WHICH PROJECTS 2 INCHES. IT IS
SD0536'81.8 FEET NORTH OF THE 2-INCH PIPE, 10 YARDS WEST OF THE EDGE OF
SD0536'THE GRASS AT THE HIGH WATER LINE, 10 FEET NORTH OF THE CENTER OF
SD0536'THE EAST-WEST ROAD 17 FEET EAST OF THE PROJECTED CENTERLINE OF
SD0536'THE CONCRETE TANK, 1 FOOT EAST OF THE FENCE CORNER AND 1 FOOT
SD0536'SOUTH OF A METAL WITNESS POST.
SD0536'
SD0536'2-INCH PIPE ON TANK, IS THE 2-INCH PIPE WHICH PROJECTS 1.2 FEET
SD0536'ABOVE THE TOP OF A 3.7X4.5-FOOT CONCRETE TANK WHICH IS BURIED,
SD0536'EXCEPT FOR THE TOP 18 INCHES WHICH PROJECTS ABOVE GROUND. TOP OF
SD0536'THE TANK IS SOMEWHAT ROUNDED AND HAS A 2-INCH, A 1 1/2-INCH AND
SD0536'3/4-INCH PIPE PROJECTING OUT OF THE TOP.
SD0536'
SD0536'TRIANGULATION STATION SNAKE 2 WILL SERVE AS AN AZIMUTH MARK FOR
SD0536'THIS STATION.
SD0536
SD0536 STATION RECOVERY (1977)
SD0536
SD0536'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1977 (CLN)
SD0536'THE STATION MARK AND REFERENCE MARKS NO. 2 AND 3 WERE RECOVERED
SD0536'IN GOOD CONDITION AND AS DESCRIBED BY L.F. SMITH IN 1971. HOWEVER,
SD0536'THE 1977 MEASUREMENTS TO THE REFERENCE MARKS ARE 12 AND 16
SD0536'MILLIMETERS LONGER, AND ANGLE BETWEEN THE MARKS 1 MINUTE 41
SD0536'SECONDS SMALLER THAN MEASURED IN 1971. THE MARKS DO NOT SHOW ANY
SD0536'SIGNS OF HAVING BEEN DISTURBED.
SD0536'
SD0536'THE STATION IS LOCATED ON NORTH BEACH PENINSULA, ON THE WEST SIDE
SD0536'OF SHOALWATER BAY, 5 MILES NORTH-NORTHEAST OF LONG BEACH, 4
SD0536'MILES SOUTH-SOUTHEAST OF KLIPSAN BEACH, 1-3/4 MILES EAST OF
SD0536'OCEANSIDE AND IN SECTION 27, T 11 N, R 11 W, ON LAND OWNED BY
SD0536'MR. MEL STRATTON.
SD0536'
SD0536'TO REACH FROM THE NAHCOTTA STORE AND POST OFFICE IN NAHCOTTA,
SD0536'GO SOUTH ON THE BLACKTOP ROAD FOR 0.4 MILE TO THE INTERSECTION
SD0536'OF BAY ROAD AND PENINSULA ROAD, CONTINUE SOUTH ON PENINSULA
SD0536'ROAD FOR 5.5 MILES TO LITSCHKE ROAD, CONTINUE SOUTH ON PENINSULA
SD0536'ROAD FOR 0.25 MILE TO TWO DRIVEWAYS SEPARATED BY A FENCE. TURN
SD0536'LEFT AND GO EAST ON THE SOUTHERN DRIVEWAY FOR 0.1 MILE TO
SD0536'MR. MEL STRATTONS HOUSE ON THE RIGHT AND A GATE ACROSS THE
SD0536'ROAD. CONTINUE STRAIGHT AHEAD THROUGH THE GATE FOR 0.1 MILE
SD0536'TO THE BEACH AND REFERENCE MARK NO. 3 ON THE LEFT AND THE
SD0536'STATION ON THE RIGHT, 75 FEET SOUTH OF THE CENTER OF THE ROAD.
SD0536'
SD0536'THE STATION MARK, IS A STANDARD DISK STAMPED LIME 2 1971, SET
SD0536'IN A ROUND CONCRETE POST FLUSH WITH THE GROUND, ON AN 18-INCH
SD0536'HIGH BANK, BUILT UP PRIMARILY OF OYSTER SHELLS, 22 YARDS WEST OF
SD0536'THE HIGH WATER LINE, 14 FEET EAST OF THE WEST EDGE OF THE BANK
SD0536'AND 1.3 FEET SOUTH OF THE PROJECTED SOUTH SIDE OF THE CONCRETE
SD0536'TANK WHICH IS DESCRIBED BELOW. UNDERGROUND MARK IS SET IN
SD0536'CONCRETE 2.5 FEET BELOW GROUND.
SD0536'
SD0536'REFERENCE MARK NO. 2, STAMPED LIME 1938 NO 2, IS A STANDARD
SD0536'DISK SET IN A 4-INCH SOIL PIPE WHICH PROJECTS 4 INCHES. IT IS

SD0536'26.0 FEET SOUTH OF THE 2-INCH PIPE AND ON LINE WITH THE CENTER
SD0536'OF THE CONCRETE TANK, 7 FEET EAST OF A FENCELINE AND ABOUT 1.5
SD0536'FEET LOWER THAN THE STATION.
SD0536'
SD0536'REFERENCE MARK NO. 3, STAMPED LIME 2 NO 3 1971, IS A STANDARD
SD0536'DISK SET IN A ROUND CONCRETE POST WHICH PROJECTS 2 INCHES. IT
SD0536'IS 81.8 FEET NORTH OF THE 2-INCH PIPE, 10 YARDS WEST OF THE
SD0536'EDGE OF THE GRASS AT THE HIGH WATER LINE, 10 FEET NORTH OF THE
SD0536'CENTER OF THE EAST-WEST ROAD 17 FEET EAST OF THE PROJECTED
SD0536'CENTERLINE OF THE CONCRETE TANK, 1 FOOT EAST OF THE FENCE CORNER
SD0536'AND 1 FOOT SOUTH OF A METAL WITNESS POST.
SD0536'
SD0536'2-INCH PIPE ON TANK, IS THE 2-INCH PIPE WHICH PROJECTS 1.2
SD0536'FT. ABOVE THE TOP OF A 3.7X4.5 FOOT CONCRETE TANK WHICH IS
SD0536'BURIED, EXCEPT FOR THE TOP 18 INCHES WHICH PROJECTS ABOVE
SD0536'GROUND. TOP OF TANK IS SOMEWHAT ROUNDED AND HAS A 2-INCH, A
SD0536'1 1/2-INCH AND 3/4-INCH PIPE PROJECTING OUT OF THE TOP.
SD0536'
SD0536'TRIANGULATION STATION SNAKE 2 WILL SERVE AS AN AZIMUTH MARK
SD0536'FOR THIS STATION.
SD0536'
SD0536'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN
SD0536'5 MILES NNE OF LONG BEACH.
SD0536
SD0536   STATION RECOVERY (1997)
SD0536
SD0536'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0536'RECOVERED AS DESCRIBED. THE HOUSE HAS BEEN SOLD. THE NEW OWNER IS
SD0536'MR. LARRY KRATZER. THE FENCE DESCRIBED IN 1977 HAS BEEN REMOVED AND
SD0536'A ROW OF LOW BUSHES SEPERATES THE DRIVEWAYS. A SMALL VOLUNTEER FIRE
SD0536'STATION (GARAGE) IS ACROSS THE STREET AND EVEN WITH THE DRIVEWAYS. THE
SD0536'STATION IS 14 EAST AND 1.3 FT (0.4 M) SOUTH OF THE THE SOUTHEAST
SD0536'CORNER OF THE CONCRETE TANK AND RECESSED ABOUT 1 TO 3 CM INTO GRASS ON
SD0536'THE OYSTER SHELL BANK (OLD ROADWAY) . THE TANK IS 3.7 FT (1.1 M) BY
SD0536'4.5 FT (1.4 M) AND PROJECTS 1 FT (0.3 M) ABOVE GROUND. THE STATION
SD0536'DOES NOT HAVE A WITNESS POST.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SC1020 ***********************************************************************
 SC1020  DESIGNATION -  M 536
 SC1020  PID         -  SC1020
 SC1020  STATE/COUNTY-  WA/PACIFIC
 SC1020  USGS QUAD   -  LONG ISLAND (1985)
 SC1020
 SC1020                         *CURRENT SURVEY CONTROL
 SC1020  ______________________________________________________________________
 SC1020* NAD 83(1991)-  46 25 44.40900(N)    123 54 21.83694(W)     ADJUSTED
 SC1020* NAVD 88     -         7.788  (meters)      25.55   (feet)  ADJUSTED
 SC1020  ______________________________________________________________________
 SC1020  X           -  -2,456,631.292 (meters)                     COMP
 SC1020  Y           -  -3,655,017.116 (meters)                     COMP
 SC1020  Z           -   4,598,232.973 (meters)                     COMP
 SC1020  LAPLACE CORR-          16.23  (seconds)                    DEFLEC96
 SC1020  ELLIP HEIGHT-         -15.61  (meters)                     GPS OBS
 SC1020  GEOID HEIGHT-         -23.29  (meters)                     GEOID96
 SC1020  DYNAMIC HT  -           7.789 (meters)      25.55  (feet)  COMP
 SC1020  MODELED GRAV-     980,727.6   (mgal)                       NAVD 88
 SC1020
 SC1020  HORZ ORDER  -  FIRST
 SC1020  VERT ORDER  -  FIRST     CLASS II
 SC1020  ELLP ORDER  -  THIRD     CLASS II
 SC1020
 SC1020.The horizontal coordinates were established by GPS observations
 SC1020.and adjusted by the National Geodetic Survey in January 1999.
 SC1020
 SC1020.The orthometric height was determined by differential leveling
 SC1020.and adjusted by the National Geodetic Survey in June 1991.
 SC1020
 SC1020.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SC1020
 SC1020.The Laplace correction was computed from DEFLEC96 derived deflections.
 SC1020
 SC1020.The ellipsoidal height was determined by GPS observations
 SC1020.and is referenced to NAD 83.
 SC1020
 SC1020.The geoid height was determined by GEOID96.
 SC1020
 SC1020.The dynamic height is computed by dividing the NAVD 88
 SC1020.geopotential number by the normal gravity value computed on the
 SC1020.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 SC1020.degrees latitude (G = 980.6199 gals.).
 SC1020
 SC1020.The modeled gravity was interpolated from observed gravity values.
 SC1020
 SC1020;                    North         East     Units   Scale      Converg.
 SC1020;SPC WA S     -   127,434.240   238,304.176   MT  0.99991829 -2 28 26.9
 SC1020;UTM  10      - 5,142,113.227   430,385.559   MT  0.99965957 -0 39 23.4
 SC1020
 SC1020                           SUPERSEDED SURVEY CONTROL
 SC1020
 SC1020.No superseded survey control is available for this station.
 SC1020
 SC1020_MARKER: DB = BENCH MARK DISK
 SC1020_SETTING: 66 = SET IN ROCK OUTCROP
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SC1020_STAMPING: M 536 1987
SC1020_PROJECTION: FLUSH
SC1020_MAGNETIC: O = OTHER; SEE DESCRIPTION
SC1020_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
SC1020+STABILITY: POSITION/ELEVATION WELL
SC1020
SC1020  HISTORY     - Date     Condition        Recov. By
SC1020  HISTORY     - 1987     MONUMENTED       NGS
SC1020  HISTORY     - 1988     GOOD             USPSQD
SC1020  HISTORY     - 19970725 GOOD             WADECO
SC1020
SC1020                          STATION DESCRIPTION
SC1020
SC1020'DESCRIBED BY NATIONAL GEODETIC SURVEY 1987
SC1020'20.7 KM (12.85 MI) NE FROM SEAVIEW.
SC1020'0.08 KM (0.05 MI) SOUTH ALONG STATE HIGHWAY 103 FROM THE POST OFFICE
SC1020'IN SEAVIEW, THENCE 20.6 KM (12.80 MI) NORTHEAST ALONG US HIGHWAY 101,
SC1020'AT THE SOUTHEAST CORNER OF THE BRIDGE OVER THE NASELLE RIVER, IN TOP
SC1020'AND CENTER OF A 3 BY 5 FT ROUND ROCK OUTCROP IN A GRASSY AREA FORMED
SC1020'BY THE JUNCTION OF PARPALA ROAD, 32.3 M (106.0 FT) SOUTHEAST OF THE
SC1020'CENTERLINE OF THE HIGHWAY, 25.9 M (85.0 FT) SOUTHEAST OF THE
SC1020'SOUTHWEST END OF THE SOUTHEAST CONCRETE GUARDRAIL OF THE BRIDGE.
SC1020'THE MARK IS 0.30 METERS  S FROM  A WITNESS POST
SC1020'THE MARK IS 0.30 M ABOVE THE GROUND.
SC1020
SC1020                          STATION RECOVERY (1988)
SC1020
SC1020'RECOVERY NOTE BY US POWER SQUADRON 1988 (KRN)
SC1020'RECOVERED IN GOOD CONDITION.
SC1020
SC1020                          STATION RECOVERY (1997)
SC1020
SC1020'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SC1020'RECOVERED AS DESCRIBED.  THE STATION IS 2.7 MILES (4.3 KM) WEST ON US
SC1020'101 FROM THE INTERSECTION OF US 101 AND SR 4.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7027 ***********************************************************************
 AH7027  DESIGNATION -  MCKENZIE HEAD RM 3
 AH7027  PID         -  AH7027
 AH7027  STATE/COUNTY-  WA/PACIFIC
 AH7027  USGS QUAD   -  CAPE DISAPPOINTMENT (1985)
 AH7027
 AH7027                         *CURRENT SURVEY CONTROL
 AH7027  ______________________________________________________________________
 AH7027* NAD 83(1991)-  46 17 02.28571(N)    124 03 55.95300(W)     ADJUSTED
 AH7027* NAVD 88     -        58.99   (meters)     193.5    (feet)  GPS OBS
 AH7027  ______________________________________________________________________
 AH7027  X           -  -2,473,349.425 (meters)                     COMP
 AH7027  Y           -  -3,657,858.428 (meters)                     COMP
 AH7027  Z           -   4,587,142.595 (meters)                     COMP
 AH7027  LAPLACE CORR-          14.26  (seconds)                    DEFLEC96
 AH7027  ELLIP HEIGHT-          34.66  (meters)                     GPS OBS
 AH7027  GEOID HEIGHT-         -24.20  (meters)                     GEOID96
 AH7027
 AH7027  HORZ ORDER  -  FIRST
 AH7027  ELLP ORDER  -  THIRD     CLASS II
 AH7027
 AH7027.The horizontal coordinates were established by GPS observations
 AH7027.and adjusted by the National Geodetic Survey in January 1999.
 AH7027
 AH7027.The orthometric height was determined by GPS observations and a
 AH7027.high-resolution geoid model using precise GPS observation and
 AH7027.processing techniques.
 AH7027
 AH7027.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7027
 AH7027.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7027
 AH7027.The ellipsoidal height was determined by GPS observations
 AH7027.and is referenced to NAD 83.
 AH7027
 AH7027.The geoid height was determined by GEOID96.
 AH7027
 AH7027;                    North         East     Units   Scale      Converg.
 AH7027;SPC WA S     -   111,871.682   225,330.915   MT  0.99992834 -2 35 24.0
 AH7027;UTM  10      - 5,126,150.801   417,915.881   MT  0.99968282 -0 46 12.7
 AH7027
 AH7027                           SUPERSEDED SURVEY CONTROL
 AH7027
 AH7027.No superseded survey control is available for this station.
 AH7027
 AH7027_MARKER: DR = REFERENCE MARK DISK
 AH7027_SETTING: 40 = ARTILLARY EMPLACEMENT
 AH7027_STAMPING: MCKENZIE HEAD NO 3 1997
 AH7027_PROJECTION: FLUSH
 AH7027_MAGNETIC: O = OTHER; SEE DESCRIPTION
 AH7027_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
 AH7027+STABILITY: POSITION/ELEVATION WELL
 AH7027_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7027+SATELLITE: SATELLITE OBSERVATIONS - 1997
 AH7027
 AH7027  HISTORY     - Date     Condition        Recov. By
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AH7027 HISTORY   - 1997   MONUMENTED   WADECO
AH7027
AH7027   STATION DESCRIPTION
AH7027
AH7027'DESCRIBED BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (TCD)
AH7027'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .
AH7027'THE STATION IS LOCATED ON MCKENZIE HEAD, A LONE PROMINENT HILL THAT IS
AH7027'2 MILES (3.2 KM) SSW OF ILWACO, WASHINGTON, AND 1.2 MILES (1.9 KM)
AH7027'SOUTHEAST OF THE NORTH HEAD LIGHTHOUSE. THE STATION IS IN FORT CANBY
AH7027'STATE PARK AT THE MOUTH OF THE COLUMBIA RIVER. TO REACH FROM THE
AH7027'INTERSECTION OF 1ST STREET AND SPRUCE STREET IN ILWACO GO WEST FOR 1
AH7027'BLOCK. CONTINUE WEST AND THEN SOUTH ON SR 100 (ROBERT GRAY DRIVE) FOR
AH7027'3.28 MILES (5.28 KM) TO THE FORT CANBY STATE PARK ENTRANCE ON RIGHT
AH7027'(WEST SIDE OF ROAD) . THE ENTRANCE TO THE CAPE DISAPPOINTMENT USCG
AH7027'STATION IS 0.05 MILES (0.08 KM) FURTHER SOUTH ON THE LEFT. FROM THE
AH7027'ENTRANCE GATE OF FORT CANBY STATE PARK PROCEED WEST ON JETTY ROAD FOR
AH7027'0.2 MILES (0.3 KM) TO INTERSECTION. TURN NORTH AND PROCEED 0.4 MILES
AH7027'(0.6 KM) THROUGH CAMPGROUND TO MCKENZIE HEAD ON LEFT AND GRASS COVERED
AH7027'PULL OFF AREA. PROCEED UPHILL FOR 0.3 MILES (0.5 KM) TO ABONDONED
AH7027'ARTILLARY EMPLACEMENT AND BUNKER ENTRANCE ON RIGHT. THE STATION IS 20
AH7027'M, (65.6 FT) 221 DEGREES GRID, FROM THE SOUTH PORTAL OF A CONCRETE
AH7027'BUNKER AND 1.0 M (3.3 FT) NORTH OF THE WEST EDGE OF THE CONCRETE
AH7027'FOUNDATION FOR A ARTILLARY PIECE (REMOVED) . THREE WOOD BENCHES ARE
AH7027'LOCATED BY THE W AND SW EDGE OF THE FOUNDATION. THE STATION IS A
AH7027'STANDARD NGS REFERENCE MARK DISK CEMENTED INTO A MASSIVE CONCRETE MAT
AH7027'FOUNDATION. THE DISK IS STAMPED MCKENZIE HEAD NO 3 1997. THIS
AH7027'STATION WAS ESTABLISHED FOR BETTER GPS VISIBILITY AND CONVENTIONALLY
AH7027'TIED TO STATION MCKENZIE HEAD 1942 (SD0090) AND MCKENZIE HEAD RM 2
AH7027'(SD0089) USING SECOND ORDER LEVELING METHODS. LEVELS HAVE BEEN RUN TO
AH7027'THIS POINT. THE STATION IS 1.232 M (4.042 FT) LOWER, 2.42 M (7.94 FT)
AH7027'NORTH, 29.5 M (96.8 FT) WEST, AND 278 DEGREES GRID FROM MCKENZIE HEAD
AH7027'1942. THE STATION IS 0.782 M (2.566 FT) LOWER, 8.69 M (28.51 FT)
AH7027'NORTH, 29.98 M (98.36 FT) WEST, AND 283 DEGREES GRID OF MCKENZIE HEAD
AH7027'RM 2. THE LEVEL RUN BETWEEN MCKENZIE HEAD 1942 AND RM 2 DOES NOT
AH7027'CHECK WITH PUBLISHED VALUES BY -9.2 CM. GPS WAS USED TO OBTAIN
AH7027'ELEVATIONS FOR COMPARISION TO THE PUBLISHED AND LEVELED DATA. THE GPS
AH7027'DERIVED ELEVATION DIFFERENCE BETWEEN RM 2 AND RM 3 WAS 0.721 M, (2.365
AH7027'FT) A -6.1 CM DIFFERENCE BETWEEN LEVELED AND GPS. GPS DERIVED
AH7027'ELEVATION DIFFERENCE BETWEEN MCKENZIE HEAD AND RM 3 WAS 1.264 M,
AH7027'(4.147 FT) A +3.2 CM DIFFERENCE BETWEEN LEVELED AND GPS. ERROR OF GPS
AH7027'WAS +/- 2 CM. DUE TO THE LARGE ELEVATION DISCREPANCY BETWEEN RM 2 AND
AH7027'MCKENZIE HEAD, ONLY THE LEVELING DATA FROM MCKENZIE HEAD 1942 WAS USED
AH7027'TO CALCULATED THE ELEVATION OF RM 3. BASED ON THIS ASSUMPTION, THE
AH7027'LEVELED NAVD88 ELEVATION OF MCKENZIE HEAD RM 3 IS 59.033 M, (193.677
AH7027'FT) OR 1.232 M (4.042 FT) LOWER THAN MCKENZIE HEAD 1942 (SD0090) .

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SC0617 ***********************************************************************
 SC0617  DESIGNATION -  MEADOW RESET
 SC0617  PID         -  SC0617
 SC0617  STATE/COUNTY-  OR/CLATSOP
 SC0617  USGS QUAD   -  GEARHART (1984)
 SC0617
 SC0617                         *CURRENT SURVEY CONTROL
 SC0617  ______________________________________________________________________
 SC0617* NAD 83(1991)-  46 01 41.22537(N)    123 55 14.90030(W)     ADJUSTED
 SC0617* NAVD 88     -        11.834  (meters)      38.83   (feet)  ADJUSTED
 SC0617  ______________________________________________________________________
 SC0617  X           -  -2,475,529.516 (meters)                     COMP
 SC0617  Y           -  -3,681,088.411 (meters)                     COMP
 SC0617  Z           -   4,567,409.778 (meters)                     COMP
 SC0617  LAPLACE CORR-          16.45  (seconds)                    DEFLEC96
 SC0617  ELLIP HEIGHT-         -11.51  (meters)                     GPS OBS
 SC0617  GEOID HEIGHT-         -23.09  (meters)                     GEOID96
 SC0617  DYNAMIC HT  -          11.835 (meters)      38.83  (feet)  COMP
 SC0617  MODELED GRAV-     980,706.4   (mgal)                       NAVD 88
 SC0617
 SC0617  HORZ ORDER  -  FIRST
 SC0617  VERT ORDER  -  FIRST     CLASS II
 SC0617  ELLP ORDER  -  THIRD     CLASS II
 SC0617
 SC0617.The horizontal coordinates were established by GPS observations
 SC0617.and adjusted by the National Geodetic Survey in January 1999.
 SC0617
 SC0617.The orthometric height was determined by differential leveling
 SC0617.and adjusted by the National Geodetic Survey in June 1991.
 SC0617.WARNING-GPS observations at this control monument resulted in a GPS
 SC0617.derived orthometric height which differed from the leveled height by
 SC0617.more than one decimeter (0.1 meter).
 SC0617.WARNING-Repeat measurements at this control monument indicate possible
 SC0617.vertical movement.
 SC0617
 SC0617.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SC0617
 SC0617.The Laplace correction was computed from DEFLEC96 derived deflections.
 SC0617
 SC0617.The ellipsoidal height was determined by GPS observations
 SC0617.and is referenced to NAD 83.
 SC0617
 SC0617.The geoid height was determined by GEOID96.
 SC0617
 SC0617.The dynamic height is computed by dividing the NAVD 88
 SC0617.geopotential number by the normal gravity value computed on the
 SC0617.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 SC0617.degrees latitude (G = 980.6199 gals.).
 SC0617
 SC0617.The modeled gravity was interpolated from observed gravity values.
 SC0617
 SC0617;                    North         East     Units   Scale      Converg.
 SC0617;SPC OR N     -   268,026.441 2,235,224.575   MT  1.00000727 -2 25 33.6
 SC0617;SPC WA S     -    82,967.391   235,240.572   MT  0.99996153 -2 29 05.5
 SC0617;UTM  10      - 5,097,583.758   428,736.119   MT  0.99966243 -0 39 45.8
 SC0617
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SC0617:                Primary Azimuth Mark                     Grid Az
SC0617:SPC OR N     -  SYLAR                                    354 09 23.8
SC0617:SPC WA S     -  SYLAR                                    354 12 55.7
SC0617:UTM  10      -  SYLAR                                    352 23 36.0
SC0617
SC0617|---------------------------------------------------------------------|
SC0617| PID    Reference Object                    Distance      Geod. Az  |
SC0617|                                                          dddmmss.s |
SC0617| SC0618 MEADOW RM 1                         25.049 METERS 09026     |
SC0617|        MEADOW RM 2                         45.625 METERS 14711     |
SC0617| SC2132 SYLAR                              APPROX. 5.5 KM 3514350.2 |
SC0617|---------------------------------------------------------------------|
SC0617
SC0617                          SUPERSEDED SURVEY CONTROL
SC0617
SC0617  NAD 83(1991)-  46 01 41.22640(N)    123 55 14.90078(W) AD(       ) 2
SC0617  NAD 83(1986)-  46 01 41.25139(N)    123 55 14.87995(W) AD(       ) 2
SC0617  NAD 27      -  46 01 41.88220(N)    123 55 10.38334(W) AD(       ) 2
SC0617  NGVD 29     -        10.735  (m)           35.22   (f) ADJ UNCH    1 2
SC0617
SC0617.Superseded values are not recommended for survey control.
SC0617.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SC0617.See file dsdata.txt to determine how the superseded data were derived.
SC0617
SC0617_MARKER: DS = TRIANGULATION STATION DISK
SC0617_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
SC0617_STAMPING: MEADOW 1874
SC0617_PROJECTION: FLUSH
SC0617_MAGNETIC: O = OTHER; SEE DESCRIPTION
SC0617_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SC0617+STABILITY: SURFACE MOTION
SC0617
SC0617  HISTORY     - Date     Condition        Recov. By
SC0617  HISTORY     - 1934     MONUMENTED       ORGS
SC0617  HISTORY     - 1936     GOOD             USE
SC0617  HISTORY     - 1941     GOOD             CGS
SC0617  HISTORY     - 1942     GOOD             CGS
SC0617  HISTORY     - 1965     GOOD             CGS
SC0617  HISTORY     - 1965     GOOD             NGS
SC0617  HISTORY     - 1971     GOOD             NGS
SC0617  HISTORY     - 1984     GOOD             USPSQD
SC0617  HISTORY     - 1987     GOOD             NGS
SC0617  HISTORY     - 1989     GOOD             USPSQD
SC0617  HISTORY     - 19970724 GOOD             WADECO
SC0617
SC0617                           STATION DESCRIPTION
SC0617
SC0617'DESCRIBED BY OREGON GEODETIC SURVEY 1934
SC0617'THIS STATION MARK FOUND BY MEASURING FROM STATION GEARHART
SC0617'2.  STATION IS ABOUT 15 FEET N OF 15TH TEE, OF GEARHART GOLF
SC0617'LINKS, ON A SMALL RIDGE, E PART OF LINKS, AND ABOUT 50 FEET W OF
SC0617'N AND S STREET.
SC0617'
SC0617'STATION RE-MARKED BY A STANDARD DISK STAMPED MEADOW 1874 SET
SC0617'IN HEAVY CONCRETE PIER 4 FEET DEEP ON EXACT CENTER OF OLD
SC0617'MARK.  AN UNDERGROUND MARK CONSISTING OF A DISK IN A CONCRETE
SC0617'BLOCK IS BURIED 4 FEET.
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SC0617
SC0617 STATION RECOVERY (1936)
SC0617
SC0617'RECOVERY NOTE BY US ENGINEERS 1936
SC0617'THIS STATION WAS RECOVERED AS DESCRIBED.
SC0617
SC0617 STATION RECOVERY (1941)
SC0617
SC0617'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1941 (LAM)
SC0617'STATION VISITED AND FOLLOWING DESCRIPTIONS PREPARED FOR 1941
SC0617'U.S.C. AND G.S. LEVEL PARTY.
SC0617'
SC0617'TRIANGULATION STATION MEADOW--GEARHART, ABOUT 0.3 MILE N OF
SC0617'INTERSECTION OF COTTAGE AVENUE AND SIXTH STREET, ABOUT 80 FEET
SC0617'W OF E FENCE OF GOLF LINKS, ABOUT MIDWAY BETWEEN FIRST STREET
SC0617'AND A STREET, IF PROJECTED WESTWARD. DISK, STAMPED MEADOW 1874,
SC0617'IN CONCRETE POST. 24.877 FEET. BY OREGON INSTITUTE OF
SC0617'TECHNOLOGY, 1934.
SC0617'
SC0617'REFERENCE MARK MEADOW--GEARHART, ABOUT 0.3 MILE N OF INTERSECTION
SC0617'OF COTTAGE AVENUE AND SIXTH STREET, ABOUT MIDWAY BETWEEN FIRST
SC0617'STREET AND A STREET, ON W LINE OF COTTAGE AVENUE. DISK, STAMPED
SC0617'MEADOW REF 1 1934, IN CONCRETE POST.
SC0617
SC0617 STATION RECOVERY (1942)
SC0617
SC0617'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1942 (JCP)
SC0617'STATION IS AT GEARHART, ON THE S END OF THE GOLF LINKS, 82 FEET
SC0617'W OF THE E FENCE LINE OF GOLF LINKS, ON A SMOOTH GRASSY HUMP.
SC0617'
SC0617'TO REACH FROM THE POST OFFICE AT GEARHART WHICH IS AT THE CORNER
SC0617'OF SIXTH STREET AND COTTAGE AVENUE GO N ON COTTAGE AVENUE ABOUT
SC0617'1/4 MILE TO STATION ON THE LEFT. IT IS BETWEEN FIRST STREET
SC0617'AND A STREET (E-W STREETS) AND ABOUT 15 FEET N OF THE 15TH TEE
SC0617'OF THE COURSE.
SC0617'
SC0617'STATION IS A BRONZE STATION DISK SET IN CONCRETE. IT IS FLUSH
SC0617'WITH THE GROUND AND IS STAMPED MEADOW 1874.
SC0617'
SC0617'REFERENCE MARK 1 IS A BRONZE REFERENCE DISK SET IN A CONCRETE
SC0617'CYLINDER. IT IS E OF AND ABOUT 7 FEET LOWER THAN THE STATION AND
SC0617'IS STAMPED MEADOW REF 1 1934.
SC0617'
SC0617'REFERENCE MARK 2 IS A BRONZE REFERENCE DISK SET IN CONCRETE. IT
SC0617'IS SE OF AND ABOUT 7 FEET LOWER THAN THE STATION AND IS STAMPED
SC0617'MEADOW NO 2 1942.
SC0617
SC0617 STATION RECOVERY (1965)
SC0617
SC0617'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1965 (PAS)
SC0617'THE STATION MARK, STAMPED MEADOW 1874, WAS RECOVERED IN GOOD
SC0617'CONDITION. THE REFERENCE MARK, STAMPED MEADOW REF 1 1934, WAS
SC0617'RECOVERED IN GOOD CONDITION. A WITNESS POST WAS PLACED 1 FOOT
SC0617'SOUTH OF THE STATION MARK AND A WITNESS POST WAS PLACED 1 FOOT
SC0617'WEST OF THE REFERENCE MARK. THE TO REACH IS ADEQUATE FOR
SC0617'RECOVERY.
SC0617

SC0617 STATION RECOVERY (1965)
SC0617
SC0617'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1965
SC0617'IN GEARHART.
SC0617'AT GEARHART, 0.25 MILE NORTH OF THE POST OFFICE ALONG COTTAGE AVENUE,
SC0617'BETWEEN A AND FIRST STREETS, 114 FEET WEST OF THE CENTER OF COTTAGE
SC0617'AVENUE, 83 FEET WEST OF THE EAST FENCE AROUND THE GOLF LINKS, 18 FEET
SC0617'NORTH OF THE FIFTEENTH TEE AND 1 FOOT NORTH OF A WITNESS POST SET IN A
SC0617'12-INCH SQUARE CONCRETE MONUMENT THAT PROJECTS 1 INCH.
SC0617
SC0617 STATION RECOVERY (1971)
SC0617
SC0617'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1971 (DRT)
SC0617'STATION MARK, STAMPED MEADOW 1874, AND RM 1, STAMPED, MEADOW
SC0617'REF 1 1934, RECOVERED AS DESCRIBED IN GOOD CONDITION. RM 2
SC0617'STAMPED, MEADOW NO 2 1942, RECOVERED IN GOOD CONDITION BUT WITHOUT
SC0617'WITNESS POST. RM 2, LIKE RM 1, IS IN THE FENCE LINE AND IS 125.5
SC0617'FEET SOUTH OF RM 1, 36.3 FEET FROM INTERSECTION OF COTTAGE AVENUE
SC0617'AND 1ST ST., AND IS 28.9 FEET W OF THE CENTERLINE OF COTTAGE
SC0617'AVENUE. STATION IS ON GOLF COURSE, BUT RMS COULD BE UTILIZED
SC0617'FOR SEA-FIX IF NECESSARY.
SC0617'
SC0617'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN
SC0617'IN GEARHART.
SC0617
SC0617 STATION RECOVERY (1984)
SC0617
SC0617'RECOVERY NOTE BY US POWER SQUADRON 1984
SC0617'NEW DESC: AT GEARHART, 0.25 MILES NORTH ALONG COTTAGE AVE. FROM THE
SC0617'INTERSECTIN OF PACIFIC WAY, ON THE FIRST LOW RIDGE WEST OF
SC0617'COTTAGEAVE, MIDWAY BETWEEM FIFTH AND SIXTH STREETS, 82 FEET WEST OF
SC0617'THE EAST FENCE AROUND GEARHART GULF COURSE, AT THE FIFTEENTH TEE, BY
SC0617'A 4 X 4 WOODEN USBM WITNESS POST. WEST OF PP AND L POWER POLE 030103.
SC0617
SC0617 STATION RECOVERY (1987)
SC0617
SC0617'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1987
SC0617'RECOVERED IN GOOD CONDITION, A NEW DESCRIPTION FOLLOWS. IN GEARHART,
SC0617'AT THE INTERSECTION OF COTTAGE AVENUE AND 6TH STREET, ON A SMALL
SC0617'KNOLL AT THE FIFTEENTH TEE OF THE GEARHART GOLF COURSE, 33.6 M (110.2
SC0617'FT) SOUTH OF THE EXTENDED CENTER OF THE STREET, 33.5 M (109.9 FT)
SC0617'WEST OF THE CENTERLINE OF THE AVENUE, 8.8 M (28.9 FT) WEST OF
SC0617'REFERENCE MARK 1, AND 2.8 M (9.2 FT) NORTH OF THE NORTH EDGE OF THE
SC0617'TEE.
SC0617'THE MARK IS 2.5 M ABOVE THE AVENUE.
SC0617
SC0617 STATION RECOVERY (1989)
SC0617
SC0617'RECOVERY NOTE BY US POWER SQUADRON 1989 (KRN)
SC0617'RECOVERED IN GOOD CONDITION.
SC0617
SC0617 STATION RECOVERY (1997)
SC0617
SC0617'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SC0617'RECOVERED AS DESCRIBED. BRASS CAP WAS FOUND TO BE LOOSE FROM
SC0617'PREFABRICATED CEMENT POST. CAP RESTAMPED AS SHOWN IN DESCRIPTION
SC0617'(I.E. MEADOW 1874) AND RECEMENTED TO THE POST.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0358 ***********************************************************************
 SD0358  DESIGNATION -  MESS
 SD0358  PID         -  SD0358
 SD0358  STATE/COUNTY-  WA/PACIFIC
 SD0358  USGS QUAD   -  OYSTERVILLE (1985)
 SD0358
 SD0358                         *CURRENT SURVEY CONTROL
 SD0358  ______________________________________________________________________
 SD0358* NAD 83(1991)-  46 34 58.03109(N)    124 01 27.80993(W)     ADJUSTED
 SD0358* NAVD 88     -         4.210  (meters)      13.81   (feet)  ADJUSTED
 SD0358  ______________________________________________________________________
 SD0358  X           -  -2,457,233.550 (meters)                     COMP
 SD0358  Y           -  -3,639,655.312 (meters)                     COMP
 SD0358  Z           -   4,609,995.839 (meters)                     COMP
 SD0358  LAPLACE CORR-          15.88  (seconds)                    DEFLEC96
 SD0358  ELLIP HEIGHT-         -19.90  (meters)                     GPS OBS
 SD0358  GEOID HEIGHT-         -23.96  (meters)                     GEOID96
 SD0358  DYNAMIC HT  -           4.210 (meters)      13.81  (feet)  COMP
 SD0358  MODELED GRAV-     980,733.1   (mgal)                       NAVD 88
 SD0358
 SD0358  HORZ ORDER  -  FIRST
 SD0358  VERT ORDER  -  FIRST     CLASS II
 SD0358  ELLP ORDER  -  THIRD     CLASS II
 SD0358
 SD0358.The horizontal coordinates were established by GPS observations
 SD0358.and adjusted by the National Geodetic Survey in January 1999.
 SD0358
 SD0358.The orthometric height was determined by differential leveling
 SD0358.and adjusted by the National Geodetic Survey in June 1991.
 SD0358
 SD0358.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0358
 SD0358.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0358
 SD0358.The ellipsoidal height was determined by GPS observations
 SD0358.and is referenced to NAD 83.
 SD0358
 SD0358.The geoid height was determined by GEOID96.
 SD0358
 SD0358.The dynamic height is computed by dividing the NAVD 88
 SD0358.geopotential number by the normal gravity value computed on the
 SD0358.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 SD0358.degrees latitude (G = 980.6199 gals.).
 SD0358
 SD0358.The modeled gravity was interpolated from observed gravity values.
 SD0358
 SD0358;                    North         East     Units   Scale      Converg.
 SD0358;SPC WA S     -   144,909.939   229,982.397   MT  0.99991460 -2 33 36.4
 SD0358;UTM  10      - 5,159,312.026   421,516.103   MT  0.99967571 -0 44 38.8
 SD0358
 SD0358:                Primary Azimuth Mark                    Grid Az
 SD0358:SPC WA S     -  GOULTER 2                               183 46 19.1
 SD0358:UTM  10      -  GOULTER 2                               181 57 21.5
 SD0358
 SD0358|----------------------------------------------------------------------|
 SD0358| PID    Reference Object                    Distance      Geod. Az  |
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SD0358|                                                                dddmmss.s |
SD0358| SC2486 SANDY POINT LIGHT                    APPROX. 4.8 KM 0523703.8 |
SD0358| SC2485 RIDDLE SPIT LIGHT                    APPROX. 3.9 KM 1101826.2 |
SD0358| SC2479 LONG ISLAND SHOAL LIGHT 1939         APPROX. 6.7 KM 1474232.5 |
SD0358|        MESS RM SE                           25.640 METERS 16150     |
SD0358| SD0515 GOULTER 2                           APPROX. 3.4 KM 1811242.7 |
SD0358|        MESS RM NW                           49.100 METERS 28935     |
SD0358|--------------------------------------------------------------------|
SD0358
SD0358                          SUPERSEDED SURVEY CONTROL
SD0358
SD0358  NAD 83(1991)-  46 34 58.02305(N)    124 01 27.81004(W) AD(       ) 2
SD0358  NAD 83(1991)-  46 34 58.02195(N)    124 01 27.80936(W) AD(       ) 2
SD0358  NAD 83(1986)-  46 34 58.02172(N)    124 01 27.79271(W) AD(       ) 2
SD0358  NAD 27      -  46 34 58.66678(N)    124 01 23.19595(W) AD(       ) 2
SD0358
SD0358.Superseded values are not recommended for survey control.
SD0358.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0358.See file dsdata.txt to determine how the superseded data were derived.
SD0358
SD0358_MARKER: DS = TRIANGULATION STATION DISK
SD0358_SETTING: 17 = SET INTO TOP OF METAL PIPE DRIVEN INTO GROUND
SD0358_STAMPING: MESS 1939
SD0358_PROJECTION: FLUSH
SD0358_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0358_STABILITY: D = MARK OF QUESTIONABLE OR UNKNOWN STABILITY
SD0358
SD0358  HISTORY     - Date     Condition        Recov. By
SD0358  HISTORY     - 1939     MONUMENTED       CGS
SD0358  HISTORY     - 1953     MONUMENTED       CGS
SD0358  HISTORY     - 1968     MONUMENTED       WAA
SD0358  HISTORY     - 1987     GOOD             NGS
SD0358  HISTORY     - 19971015 GOOD             WADECO
SD0358
SD0358                           STATION DESCRIPTION
SD0358
SD0358'DESCRIBED BY COAST AND GEODETIC SURVEY 1939 (WMS)
SD0358'STATION IS IN A FLAT GRASSY AREA AT THE N END OF AN EXTENSIVE MEADOW
SD0358'ON LAND PRESENTLY OWNED BY ED. GOULTER, AND ABOUT 0.5 MILE N OF HIS
SD0358'DAIRY BARN.  IT IS ABOUT 60 METERS W OF THE HIGH-WATER LINE ON THE
SD0358'E AND 45 METERS S OF THE HIGH-WATER LINE ON THE N.  ABOUT HALF-WAY
SD0358'BETWEEN THE STATION AND THE HIGH-WATER LINE ON THE E IS A HEDGE OF
SD0358'SMALL SPRUCE TREES APPROXIMATELY 80 METERS IN LENGTH AND PARALLEL TO
SD0358'THE BEACH.  THE STATION IS 16.5 METERS NW OF A 30-INCH BROKEN-TOP
SD0358'SPRUCE TREE, AND 32.5 METERS E BY S FROM 2 LARGE CRABAPPLE TREES IN
SD0358'A GROUP.
SD0358'
SD0358'THE STATION MARK IS A STANDARD BRONZE DISK STAMPED MESS 1939.  IT IS
SD0358'CEMENTED IN THE TOP END OF A 60-INCH SECTION OF 4-INCH CAST-IRON
SD0358'SOIL PIPE WHICH PROJECTS 4 INCHES.
SD0358'
SD0358'THERE IS NO SUBSURFACE MARK.
SD0358'
SD0358'REFERENCE MARK NO.1 IS A STANDARD REFERENCE DISK CEMENTED IN THE
SD0358'TOP END OF A 30-INCH SECTION OF CAST-IRON SOIL PIPE WHICH PROJECTS 3
SD0358'INCHES.
SD0358'
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SD0358'REFERENCE MARK NO.2 IS MARKED THE SAME AS NO.1. THE PIPE PROJECTS 3
SD0358'INCHES AND IS APPROXIMATELY ON LINE BETWEEN THE STATION AND THE CRAB
SD0358'APPLE TREES.
SD0358'
SD0358'TO REACH THE STATION BY ROAD GO W 0.4 MILE FROM OYSTERVILLE TO THE
SD0358'STACKPOLE ROAD. TURN RIGHT ON THE STACKPOLE ROAD AND GO N 2.6 MILES
SD0358'TO A CURVE TO THE LEFT WHICH IS JUST W OF THE N END OF THE MEADOW.
SD0358'LEAVE ROAD AND WALK E ACROSS THE MEADOW TO THE STATION.
SD0358
SD0358   STATION RECOVERY (1953)
SD0358
SD0358'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1953 (FN)
SD0358'RECOVERED
SD0358'
SD0358'STATION AND REFERENCE MARKS RECOVERED IN GOOD CONDITION. THE
SD0358'CRABAPPLE TREES MENTIONED IN THE ORIGINAL DESCRIPTION HAVE BEEN
SD0358'DESTROYED. A COMPLETE DESCRIPTION FOLLOWS--
SD0358'
SD0358'ON THE EAST SIDE OF THE NORTH BEACH PENINSULA ABOUT 2.3 MILES NORTH
SD0358'OF OYSTERVILLE ON LAND OWNED BY MR. GOULTER, 51 METERS SOUTH OF THE
SD0358'MEAN HIGH WATER LINE NORTH OF THE STATION, 27 METERS WEST OF A
SD0358'FENCE, 26 METERS SOUTH OF THE INTERSECTION OF A FENCE LINE AND A
SD0358'NORTH-SOUTH TREE LINE, AND 16.5 METERS NORTHWEST OF A BROKEN-TOP
SD0358'30-INCH SPRUCE TREE. ABOUT HALFWAY BETWEEN THE STATION AND THE
SD0358'SHORELINE ON THE EAST IS A HEDGE OF SPRUCE TREES ABOUT 65 METERS IN
SD0358'LENGTH AND PARALLEL TO THE BEACH. A STANDARD DISK STAMPED MESS
SD0358'1939 CEMENTED IN THE TOP OF A 5-FOOT SECTION OF 4-INCH CAST IRON
SD0358'SOIL PIPE PROJECTING 5 INCHES. THERE IS NO UNDERGROUND MARK.
SD0358'
SD0358'REFERENCE MARK 1 IS SOUTH SOUTHEAST OF THE STATION, A STANDARD DISK
SD0358'CEMENTED IN THE TOP OF A 30-INCH SECTION OF 4-INCH CAST IRON SOIL
SD0358'PIPE SET FLUSH WITH THE GROUND.
SD0358'
SD0358'REFERENCE MARK 2 IS NORTHWEST OF THE STATION, A STANDARD DISK SET IN
SD0358'THE TOP OF A 30-INCH SECTION OF 4-INCH CAST IRON SOIL PIPE SET FLUSH
SD0358'WITH THE GROUND.
SD0358'
SD0358'TO REACH FROM OYSTERVILLE GO WEST 0.4 MILE AND TURN RIGHT ON
SD0358'STACKPOLE ROAD CONTINUING NORTH FOR 2.5 MILES TO A CURVE TO THE
SD0358'LEFT WHICH IS JUST WEST OF THE NORTH END OF A MEADOW. LEAVE ROAD
SD0358'AND WALK EAST ACROSS MEADOW TO THE STATION
SD0358'
SD0358'NEW DISTANCES TO THE REFERENCE MARKS--R.M. 1 25.640 METERS, R.M. 2
SD0358'15.000 METERS.
SD0358
SD0358   STATION RECOVERY (1968)
SD0358
SD0358'RECOVERY NOTE BY WALKER AND ASSOCIATES INCORPORATED 1968
SD0358'MESS 1939 GOOD
SD0358'
SD0358'SET METAL WITNESS TAG IN 30 IN BROKEN SPRUCE MENTIONED IN
SD0358'DESCRIPTION THAT IS 54.3 FT SW OF STATION. DID NOT HAVE TIME TO
SD0358'SEARCH FOR RMS.
SD0358
SD0358   STATION RECOVERY (1987)
SD0358
SD0358'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1987

SD0358'31.0 KM (19.25 MI) NORTH FROM SEAVIEW.
SD0358'0.08 KM (0.05 MI) SOUTH ALONG STATE HIGHWAY 103 FROM THE POST OFFICE
SD0358'IN SEAVIEW, THENCE 0.80 KM (0.50 MI) EAST ALONG US HIGHWAY 101,
SD0358'THENCE 25.3 KM (15.70 MI) NORTH ALONG SANDRIDGE ROAD, THENCE 0.48 KM
SD0358'(0.30 MI) WEST ALONG OYSTERVILLE ROAD, THENCE 4.19 KM (2.60 MI) NORTH
SD0358'ALONG STACKPOLE ROAD, THENCE ABOUT 0.2 KM (0.10 MI) EAST ALONG A
SD0358'TRACK ROAD AND ACROSS A LOW MEADOW, AT A CLUSTER OF FOUR 18 INCH
SD0358'DIAMETER SPRUCE TREES NEAR THE EDGE OF THE BAY, 0.45 M (1.5 FT)
SD0358'SOUTHEAST OF A 2 BY 2-INCH GUYED SIGNAL, DISK IN THE TOP OF A 4-INCH
SD0358'CAST IRON SOIL PIPE.
SD0358'THE MARK IS 0.61 METERS S FROM A WITNESS POST
SD0358'THE MARK IS ABOVE LEVEL WITH THE GROUND.
SD0358
SD0358   STATION RECOVERY (1997)
SD0358
SD0358'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0358'RECOVERED AS DESCRIBED. FROM OYSTERVILLE PROCEED WEST ON OYSTERVILLE
SD0358'ROAD TO STACKPOLE ROAD. TURN NORTH AND FOLLOW STACKPOLE ROAD NORTH
SD0358'FOR ABOUT 2.55 MILES (4.10 KM) TO CURVE TO NORTHWEST AND PULL OFF AREA
SD0358'ON RIGHT. THE PULL OFF IS LOCATED SOUTH OF A 3 STORY GRAY HOUSE WITH
SD0358'FENCE. THE LONE CLUSTER OF FOUR SPRUCE TREES DESCRIBED IN 1987 MAY BE
SD0358'SEEN FROM THIS POINT ACROSS A LOW MEADOW (WET AT HIGH TIDE) . THE
SD0358'STATION IS ABOUT 15 M (49.2 FT) SOUTHEAST FROM THE THREE LARGEST
SD0358'SPRUCE TREES, 4 M (13.1 FT) FROM THE STORM HIGH WATER LINE, 0.61 M
SD0358'(2.00 FT) SOUTH OF A ORANGE NGS WITNESS POST, AND PROJECTS 4 INCHES
SD0358'ABOVE THE GROUND. REFERENCE MARKS WERE NOT RECOVERED AFTER A 30 MIN
SD0358'SEARCH.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SC2198 ***********************************************************************
 SC2198  DESIGNATION -  MIT
 SC2198  PID         -  SC2198
 SC2198  STATE/COUNTY-  OR/CLATSOP
 SC2198  USGS QUAD   -  WARRENTON (1985)
 SC2198
 SC2198                        *CURRENT SURVEY CONTROL
 SC2198  ______________________________________________________________________
 SC2198* NAD 83(1991)-  46 11 02.01175(N)    123 58 14.19076(W)     ADJUSTED
 SC2198* NAVD 88     -        28.7    (meters)      94.     (feet)  GPS OBS
 SC2198  ______________________________________________________________________
 SC2198  X           -  -2,471,762.644 (meters)                     COMP
 SC2198  Y           -  -3,668,596.822 (meters)                     COMP
 SC2198  Z           -   4,579,426.420 (meters)                     COMP
 SC2198  LAPLACE CORR-          15.13  (seconds)                    DEFLEC96
 SC2198  ELLIP HEIGHT-           4.92  (meters)                     GPS OBS
 SC2198  GEOID HEIGHT-         -23.69  (meters)                     GEOID96
 SC2198
 SC2198  HORZ ORDER  -  FIRST
 SC2198  ELLP ORDER  -  THIRD     CLASS II
 SC2198
 SC2198.The horizontal coordinates were established by GPS observations
 SC2198.and adjusted by the National Geodetic Survey in January 1999.
 SC2198
 SC2198.The orthometric height was determined by GPS observations.
 SC2198
 SC2198.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SC2198
 SC2198.The Laplace correction was computed from DEFLEC96 derived deflections.
 SC2198
 SC2198.The ellipsoidal height was determined by GPS observations
 SC2198.and is referenced to NAD 83.
 SC2198
 SC2198.The geoid height was determined by GEOID96.
 SC2198
 SC2198;                     North         East     Units   Scale      Converg.
 SC2198;SPC OR N     -   285,490.182 2,232,115.711   MT  1.00005198 -2 27 40.7
 SC2198;SPC WA S     -   100,432.955   232,150.030   MT  0.99993897 -2 31 15.7
 SC2198;UTM  10      - 5,114,937.337   425,093.044   MT  0.99966897 -0 42 01.4
 SC2198
 SC2198                          SUPERSEDED SURVEY CONTROL
 SC2198
 SC2198  NAD 83(1991)-  46 11 02.01358(N)    123 58 14.19019(W) AD(       ) 4
 SC2198  NAD 83(1986)-  46 11 02.02475(N)    123 58 14.16600(W) AD(       ) 4
 SC2198  NAD 27      -  46 11 02.65764(N)    123 58 09.63915(W) AD(       ) 3
 SC2198
 SC2198.Superseded values are not recommended for survey control.
 SC2198.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
 SC2198.See file dsdata.txt to determine how the superseded data were derived.
 SC2198
 SC2198_MARKER: DW = NOS HYDROGRAPHIC SURVEY DISK
 SC2198_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 SC2198_STAMPING: MIT 1935
 SC2198_PROJECTION: FLUSH
 SC2198_MAGNETIC: A = STEEL ROD ADJACENT TO MONUMENT
 SC2198_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
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SC2198+STABILITY: SURFACE MOTION
SC2198_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SC2198+SATELLITE: SATELLITE OBSERVATIONS - September 29, 1998
SC2198
SC2198 HISTORY   - Date   Condition   Recov. By
SC2198 HISTORY   - 1958   MONUMENTED   CGS
SC2198 HISTORY   - 19971204 GOOD   WADECO
SC2198 HISTORY   - 19980929 GOOD   WADOE
SC2198 HISTORY   - 19990419 GOOD   WADECO
SC2198
SC2198   STATION DESCRIPTION
SC2198
SC2198'DESCRIBED BY COAST AND GEODETIC SURVEY 1958 (VRS)
SC2198'LOCATED 1.5 MILES SOUTHWEST OF HAMMOND IN FORT STEVENS STATE PARK,
SC2198'0.7 MILES WEST OF RIDGE ROAD, 0.25 MILE NORTH OF PETER IREDALE
SC2198'ROAD AND APPROXIMATELY 200 FEET WEST OF A GRAVEL ROAD, UNDER THE
SC2198'CENTER OF A U. S. ENGINEER HYDROGRAPHIC SIGNAL WHICH IS ON A HIGH
SC2198'BRUSHY DUNE. THE HYDROGRAPHIC SIGNAL IS U. S. E. STATION BEACH
SC2198'ROAD.
SC2198'
SC2198'STATION MARK IS A STANDARD HYDROGRAPHIC DISK SET IN AN 8-INCH
SC2198'SQUARE CONCRETE MONUMENT PROJECTING 4 INCHES ABOVE THE
SC2198'GROUND. STAMPED MIT 1935.
SC2198'
SC2198'TO REACH FROM THE POST OFFICE AT HAMMOND, PROCEED WEST 0.25 MILE
SC2198'TO RIDGE ROAD. TURN SOUTH AND PROCEED 1.1 MILES TO SIGN FORT
SC2198'STEVENS STATE PARK AND PAVED ROAD WEST (PETER IREDALE ROAD). TURN
SC2198'RIGHT (WEST) AND PROCEED 0.65 MILE ALONG MAIN ROAD THROUGH PARK
SC2198'TO GRAVEL ROAD NORTH. TURN RIGHT AND PROCEED 0.3 MILE NORTH TO
SC2198'TRAIL ON LEFT. WALK ABOUT 200 FEET WEST ALONG TRAIL TO
SC2198'HYDROGRAPHIC SIGNAL AND STATION ON RIGHT.
SC2198
SC2198   STATION RECOVERY (1997)
SC2198
SC2198'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SC2198'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) . TO
SC2198'REACH FROM THE INTERSECTION OF PACIFIC AVENUE AND LAKE DRIVE IN
SC2198'HAMMOND GO SOUTH ON LAKE DRIVE 0.37 MILES (0.60 KM) TO Y INTERSECTION
SC2198'WITH RIDGE ROAD. PROCEED SOUTH ON RIDGE ROAD FOR 0.25 MILES (0.40 KM)
SC2198'TO ENTRANCE TO FORT STEVENS STATE PARK. PROCEED WEST THEN NORTHWEST
SC2198'ON PETER IREDALE ROAD THROUGH FLASHING STOP LIGHT AND CAMPGROUND FOR
SC2198'ABOUT 0.7 MILES (1.1 KM) TO A 4 BY 4 FT (1.2 M) SIGN WITH ARROWS TO
SC2198'BATTERY RUSSELL, THE PETER IREDALE, HAMMOND, AND WARRENTON AND A
SC2198'INTERSECTING ROAD ON LEFT (WHICH LEADS TO THE PARKING AREA FOR THE
SC2198'PETER IREDALE SHIP WRECK) . FROM THIS INTERSECTION GO SOUTHEAST
SC2198'(RETRACE PATH) FOR 0.1 MILE (0.2 KM) TO SMALL BRIDGE WHICH PASSES
SC2198'VEHICLES OVER A PAVED BIKE PATH. PARK VEHICLE AND PROCEED ON FOOT
SC2198'NORTHEAST AND UPHILL ON THE BIKE TRAIL FOR ABOUT 200 FT (61.0 M) TO A
SC2198'FORK IN THE TRAIL. TAKE THE LEFT (NORTH) FORK AND PROCEED ABOUT 250
SC2198'FT (76.2 M) IN A NORTHWESTERLY DIRECTION UNTILL A SANDY TRAIL IS SEEN
SC2198'ON THE LEFT (NORTHWEST) SIDE OF THE BIKE TRAIL. FOLLOW THIS HIKING
SC2198'PATH UPHILL AND NORTH ALONG A OLD VEGETATED DUNE LINE ABOUT 425 FT
SC2198'(129.5 M) TILL A POWER LINE RIGHT-OF-WAY IS REACHED (POWER POLE NO.
SC2198'87743 IS JUST TO LEFT OF TRAIL) . CONTINUE NORTH VIA TRAIL FOR ABOUT
SC2198'1320 FT (402.3 M) OVER HILLY TERRAIN. IN THE LAST 100 FT (30.5 M)
SC2198'PROCEED NORTHEAST UP THE STEEP TRAIL THAT CLIMES A HIGH BRUSHY DUNE TO
SC2198'REACH THE STATION. THE STATION IS ON TOP OF THE HIGH BRUSH DUNE. TO

SC2198'REACH CONTINUE NORTH VIA TRAIL TO A FLAT WOODED AREA AND INTERSECTION
SC2198'WITH A SMALL WINDY TRAIL TO THE WEST. FOLLOW THIS TRAIL ABOUT 50 FT
SC2198'(15.2 M) TO THE WEST EDGE OF DUNE AND STATION. THE STATION IS
SC2198'CENTERED BETWEEN THE 1 X 1 FT (0.3 M) CEMENT FOOTINGS FOR THE OLD
SC2198'U.S.E. HYDROGRAPHIC SIGNAL. THE SIGNAL HAS FALLEN TO THE GROUND AND
SC2198'THE JUMBLE OF 4 X 4 WHITE POSTS WILL SERVE AS WITNESS POSTS (THE
SC2198'SOUTHWEST MOST FOOTING STILL HAS A 6 FT (1.8 M) TALL SECTION OF 4 X 4
SC2198'STANDING VERTICALLY) . ENCUMBERED HIKING TIME IS 15 MINUTES. THE
SC2198'STATION IS STAMPED MIT 1935 AND IS 2 INCHES BELOW GRADE. NOTE THAT
SC2198'THE STATION IS ABOUT 60 M (196.8 FT) EAST OF PETER IREDALE ROAD AND ON
SC2198'THE SECOND NORTH-SOUTH TRENDING DUNE LINE (ON THE LARGEST DUNE) AND
SC2198'ABOUT 450 M (1476.4 FT) NNW OF THE INTERSECTION OF PETER IREDALE ROAD
SC2198'AND THE ROAD TO THE PETER IREDALE PARKING AREA (DESCRIBED ABOVE) . IF
SC2198'UNENCUMBERED AND THE WEATHER HAS BEEN DRY THIS ROUTE MAY BE
SC2198'PREFERABLE.
SC2198
SC2198 STATION RECOVERY (1998)
SC2198
SC2198'RECOVERY NOTE BY WA STATE DEPT ECOLOGY 1998 (RCD)
SC2198'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) . TO
SC2198'REACH FROM THE INTERSECTION OF PACIFIC AVENUE AND LAKE DRIVE IN
SC2198'HAMMOND GO SOUTH ON LAKE DRIVE 0.37 MILES (0.60 KM) TO Y INTERSECTION
SC2198'WITH RIDGE ROAD. PROCEED SOUTH ON RIDGE ROAD FOR 0.25 MILES (0.40 KM)
SC2198'TO ENTRANCE TO FORT STEVENS STATE PARK (CAMPING ENTRANCE) . PROCEED
SC2198'WEST THEN NORTHWEST ON PETER IREDALE ROAD THROUGH FLASHING STOP LIGHT
SC2198'AND CAMPGROUND FOR ABOUT 0.7 MILES (1.1 KM) TO A 4 BY 4 FT (1.2 M)
SC2198'SIGN WITH ARROWS TO BATTERY RUSSELL, THE PETER IREDALE, HAMMOND, AND
SC2198'WARRENTON AND A INTERSECTING ROAD ON LEFT (WHICH LEADS TO THE PARKING
SC2198'AREA FOR THE PETER IREDALE SHIP WRECK) . FROM THIS INTERSECTION GO
SC2198'SOUTHEAST (RETRACE PATH) FOR 0.1 MILE (0.2 KM) TO SMALL BRIDGE WHICH
SC2198'PASSES VEHICLES OVER A PAVED BIKE PATH. PARK VEHICLE AND PROCEED ON
SC2198'FOOT NORTHEAST AND UPHILL ON THE BIKE TRAIL FOR ABOUT 200 FT (61.0 M)
SC2198'TO A FORK IN THE TRAIL. TAKE THE LEFT (NORTHWEST) FORK AND PROCEED
SC2198'ABOUT 250 FT (76.2 M) IN A NORTHWESTERLY DIRECTION UNTILL A SANDY
SC2198'TRAIL IS SEEN ON THE LEFT (NORTHWEST) SIDE OF THE BIKE TRAIL. FOLLOW
SC2198'THIS HIKING PATH UPHILL AND NORTH ALONG A OLD VEGETATED DUNE LINE
SC2198'ABOUT 425 FT (129.5 M) TILL A POWER LINE RIGHT-OF-WAY IS REACHED
SC2198'(POWER POLE NO. 87743 IS JUST TO LEFT OF TRAIL) . CONTINUE NORTH VIA
SC2198'TRAIL FOR ABOUT 1320 FT (402.3 M) OVER HILLY TERRAIN. IN THE LAST 100
SC2198'FT (30.5 M) PROCEED NORTHEAST UP THE STEEP TRAIL THAT CLIMES A HIGH
SC2198'BRUSHY DUNE TO REACH THE STATION. THE STATION IS ON TOP OF THE HIGH
SC2198'BRUSH DUNE. TO REACH CONTINUE NORTH VIA TRAIL TO A FLAT WOODED AREA
SC2198'AND PLATIC ORANGE WITNESS POST. FOLLOW THE SMALL WINDY TRAIL JUST
SC2198'NORTH OF POST WEST ABOUT 50 FT (15.2 M) TO THE WEST EDGE OF DUNE AND
SC2198'STATION ON RIGHT. THE STATION IS CENTERED BETWEEN THE 1 X 1 FT (0.3
SC2198'M) CEMENT FOOTINGS FOR THE OLD U.S.E. HYDROGRAPHIC SIGNAL. THE
SC2198'SIGNAL HAS FALLEN TO THE GROUND AND THE JUMBLE OF 4 X 4 WHITE POSTS
SC2198'WILL SERVE AS WITNESS POSTS (THE SOUTHWEST MOST FOOTING STILL HAS A 6
SC2198'FT (1.8 M) TALL SECTION OF 4 X 4 STANDING VERTICALLY) . A ORANGE
SC2198'WITNESS POST IS SET 1.5 FT (0.5 M) NORTH OF THE STATION. ENCUMBERED
SC2198'HIKING TIME IS 25 MINUTES. THE STATION IS STAMPED MIT 1935 AND IS 2
SC2198'INCHES BELOW GRADE. NOTE THAT THE STATION IS ABOUT 60 M (196.8 FT)
SC2198'EAST OF PETER IREDALE ROAD AND ON THE SECOND NORTH-SOUTH TRENDING DUNE
SC2198'LINE (ON THE LARGEST DUNE) AND ABOUT 450 M (1476.4 FT) NNW OF THE
SC2198'INTERSECTION OF PETER IREDALE ROAD AND THE ROAD TO THE PETER IREDALE
SC2198'PARKING AREA (DESCRIBED ABOVE) . IF UNENCUMBERED AND THE WEATHER HAS
SC2198'BEEN DRY THIS ROUTE MAY BE PREFERABLE.

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SC2198
SC2198                          STATION RECOVERY (1999)
SC2198
SC2198'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
SC2198'RECOVERED AS DESCRIBED.  ORANGE WITNESS POST SET 0.25 M (0.82 FT)
SC2198'NORTH OF THE STATION.  ADDITIONAL WITNESS POST SET ABOUT 20 M (65.6
SC2198'FT) SE OF STATION TO MARK THE TURN-OFF FROM THE MAIN TRAIL -FOLLOW NW
SC2198'TRENDING SMALL TAIL TO STATION.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0720 ***********************************************************************
 SD0720  DESIGNATION -  MOTULIPS
 SD0720  PID         -  SD0720
 SD0720  STATE/COUNTY-  WA/GRAYS HARBOR
 SD0720  USGS QUAD   -  COPALIS CROSSING (1984)
 SD0720
 SD0720                        *CURRENT SURVEY CONTROL
 SD0720  ______________________________________________________________________
 SD0720* NAD 83(1991)-  47 04 07.19116(N)    124 01 43.69254(W)     ADJUSTED
 SD0720* NAVD 88     -        15.49   (meters)      50.8    (feet)  GPS OBS
 SD0720  ______________________________________________________________________
 SD0720  X           -  -2,435,474.675 (meters)                     COMP
 SD0720  Y           -  -3,606,827.150 (meters)                     COMP
 SD0720  Z           -   4,646,961.170 (meters)                     COMP
 SD0720  LAPLACE CORR-          13.38  (seconds)                    DEFLEC96
 SD0720  ELLIP HEIGHT-          -8.62  (meters)                     GPS OBS
 SD0720  GEOID HEIGHT-         -23.95  (meters)                     GEOID96
 SD0720
 SD0720  HORZ ORDER  -  FIRST
 SD0720  ELLP ORDER  -  THIRD     CLASS II
 SD0720
 SD0720.The horizontal coordinates were established by GPS observations
 SD0720.and adjusted by the National Geodetic Survey in January 1999.
 SD0720
 SD0720.The orthometric height was determined by GPS observations and a
 SD0720.high-resolution geoid model using precise GPS observation and
 SD0720.processing techniques.
 SD0720
 SD0720.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0720
 SD0720.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0720
 SD0720.The ellipsoidal height was determined by GPS observations
 SD0720.and is referenced to NAD 83.
 SD0720
 SD0720.The geoid height was determined by GEOID96.
 SD0720
 SD0720;                    North         East     Units   Scale      Converg.
 SD0720;SPC WA S     -   198,880.826   232,060.108   MT  0.99995021 -2 33 47.9
 SD0720;UTM  10      - 5,213,308.070   421,885.180   MT  0.99967499 -0 45 11.9
 SD0720
 SD0720:                Primary Azimuth Mark                    Grid Az
 SD0720:SPC WA S     -  MOTULIPS AZ MK                          118 08 18.3
 SD0720:UTM  10      -  MOTULIPS AZ MK                          116 19 42.3
 SD0720
 SD0720|---------------------------------------------------------------------|
 SD0720| PID    Reference Object                    Distance      Geod. Az  |
 SD0720|                                                          dddmmss.s |
 SD0720|        MOTULIPS RM 1                      48.768 METERS 09918     |
 SD0720|        MOTULIPS AZ MK                                    1153430.4 |
 SD0720|        MOTULIPS RM 2                      32.001 METERS 24827     |
 SD0720|---------------------------------------------------------------------|
 SD0720
 SD0720                          SUPERSEDED SURVEY CONTROL
 SD0720
 SD0720  NAD 83(1991)-  47 04 07.19087(N)    124 01 43.69857(W) AD(       ) 1
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SD0720  NAD 83(1986)-  47 04 07.18298(N)    124 01 43.69986(W) AD(       ) 1
SD0720  NAD 27      -  47 04 07.86400(N)    124 01 39.07900(W) AD(       ) 1
SD0720  NGVD 29     -        12.3    (m)           40.     (f) VERT ANG
SD0720
SD0720.Superseded values are not recommended for survey control.
SD0720.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0720.See file dsdata.txt to determine how the superseded data were derived.
SD0720
SD0720_MARKER: DD = SURVEY DISK
SD0720_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
SD0720_STAMPING: MOTULIPS 1953
SD0720_PROJECTION: FLUSH
SD0720_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0720_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0720+STABILITY: SURFACE MOTION
SD0720
SD0720  HISTORY     - Date     Condition        Recov. By
SD0720  HISTORY     - 1953     MONUMENTED       CGS
SD0720  HISTORY     - 1964     MONUMENTED       CGS
SD0720  HISTORY     - 1974     MONUMENTED       RAYONI
SD0720  HISTORY     - 19971015 GOOD             WADECO
SD0720
SD0720                          STATION DESCRIPTION
SD0720
SD0720'DESCRIBED BY COAST AND GEODETIC SURVEY 1953 (RAG)
SD0720'THE STATION IS LOCATED ABOUT 8.75 MILES NORTHWEST OF HOQUIAM,
SD0720'ABOUT 6.7 MILES EAST SOUTHEAST OF COPALIS, 101 FEET WEST OF THE
SD0720'INTERSECTION OF TWO PAVED ROADS AND 40.7 FEET SOUTHWEST OF POWER
SD0720'POLE NUMBER T-105.
SD0720'
SD0720'TO REACH FROM HOQUIAM.  GO NORTH ON U.S. HIGHWAY NUMBER 101 FOR
SD0720'4.4 MILES.  TURN LEFT, ONTO A PAVED ROAD WHICH LEADS TOWARD THE
SD0720'BEACH, AND GO WESTERLY FOR 5.9 MILES TO THE STATION IN THE
SD0720'NORTHWEST CORNER OF A T ROAD INTERSECTION.
SD0720'
SD0720'THE STATION IS A STANDARD DISK, STAMPED MOTULIPS 1953, SET IN
SD0720'THE TOP OF A SQUARE CONCRETE POST WHICH PROJECTS 6 INCHES.
SD0720'
SD0720'THE UNDERGROUND STATION IS A STANDARD DISK, STAMPED MOTULIPS
SD0720'1953, SET INTO A MASS OF CONCRETE WHICH LIES ABOUT 40 INCHES BELOW
SD0720'THE SURFACE OF THE SOIL.
SD0720'
SD0720'REFERENCE MARK NUMBER 1 IS A STANDARD DISK, STAMPED MOTULIPS NO
SD0720'1 1953, SET IN THE TOP OF A SQUARE CONCRETE POST WHICH PROJECTS 1
SD0720'INCH.  IT IS LOCATED AT THE SOUTHEAST EDGE OF A GRAVELED DRIVEWAY,
SD0720'30 FEET NORTH OF THE CENTERLINE OF THE HIGHWAY AND ABOUT 10 FEET
SD0720'LOWER THAN THE STATION.
SD0720'
SD0720'REFERENCE MARK NUMBER 2 IS A STANDARD DISK, STAMPED MOTULIPS NO 2
SD0720'1953, SET IN THE TOP OF A SQUARE CONCRETE POST WHICH PROJECTS 2
SD0720'INCHES.  IT IS LOCATED 30 FEET NORTH OF THE CENTERLINE OF THE PAVED
SD0720'ROAD, 5 FEET NORTH OF A CUTBANK AND ABOUT THE SAME ELEVATION AS
SD0720'THE STATION.
SD0720'
SD0720'THE AZIMUTH MARK IS A STANDARD DISK, STAMPED MOTULIPS 1953, SET
SD0720'IN THE TOP OF A SQUARE CONCRETE POST WHICH PROJECTS 5 INCHES.  IT
SD0720'IS LOCATED 0.4 MILE EAST SOUTHEAST OF THE STATION, 29 FEET NORTH
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SD0720'OF THE CENTERLINE OF A PAVED ROAD, 3 FEET NORTHWEST OF TELEPHONE
SD0720'POLE NUMBER 410 AND ABOUT 2 FEET HIGHER THAN THE ROAD.
SD0720'
SD0720'PICTURE POINT A IS THE BASE AND CENTER OF A SMALL, LONE, TREE
SD0720'WHICH IS LOCATED 7 FEET WEST OF THE GRAVELED DRIVEWAY WHICH LEADS
SD0720'INTO A PRIVATE YARD. IT IS LOCATED 7.607 FEET LOWER THAN THE
SD0720'STATION.
SD0720'
SD0720'OBSERVATIONS WERE MADE FROM A 114 FOOT TOWER.
SD0720
SD0720   STATION RECOVERY (1964)
SD0720
SD0720'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1964 (IRR)
SD0720'THE STATION WAS RECOVERED AS DESCRIBED EXCEPT FOR A 9-FOOT
SD0720'DISCREPANCY ON THE MEASUREMENT TO REFERENCE MARK NO. 1, THE STATION
SD0720'MARK PROJECTS ONLY 1 INCH AND THE POWER POLES HAVE BEEN CHANGED,
SD0720'MAKING NEW REFERENCES NECESSARY.
SD0720'
SD0720'THE STATION MARK IS 137 FEET NORTHWEST OF POWER POLE NO. A P 9,
SD0720'69 FEET SOUTHWEST OF THE CENTER OF THE HIGHWAY, 51 FEET NORTH OF
SD0720'THE CENTER OF GRASS CREEK ROAD AND ON A BANK ABOUT 5 FEET HIGHER
SD0720'THAN THE SURFACES OF THE TWO ROADS.
SD0720'
SD0720'REFERENCE MARK NO. 1 IS ABOUT 2 INCHES BELOW THE SURFACE OF THE
SD0720'LAWN AT THE ARTIFICIAL-STONE HOUSE ABOUT 50 YARDS EAST OF THE
SD0720'STATION. IT IS 79.6 FEET SOUTHWEST OF THE SOUTH CORNER OF THE
SD0720'HOUSE, 0.8 FEET SOUTHEAST OF THE SOUTHEAST EDGE OF THE CONCRETE
SD0720'DRIVEWAY, 25 FEET NORTHEAST OF THE CENTER OF THE HIGHWAY AND 18.4
SD0720'FEET SOUTHEAST OF TELEPHONE POLE NO. 417.
SD0720'
SD0720'REFERENCE MARK NO. 2 IS 77 FEET EAST OF A POWER POLE, 52-1/2
SD0720'FEET WEST OF A TELEPHONE POLE, 29 FEET NORTH OF THE CENTER OF
SD0720'GRASS CREEK ROAD AND 4 FEET NORTH OF THE EDGE OF THE ROAD CUT.
SD0720'
SD0720'THE AZIMUTH MARK IS 0.25 MILE EAST-SOUTHEAST OF THE STATION,
SD0720'INSTEAD OF 0.4 MILE, 3 FEET NORTH OF POLE NO. 410 AND 2 FEET
SD0720'SOUTHWEST OF A METAL WITNESS POST.
SD0720'
SD0720'DIRECTIONS TO REACH THE STATION ARE ADEQUATE.
SD0720
SD0720   STATION RECOVERY (1974)
SD0720
SD0720'RECOVERY NOTE BY ITT RAYONIER INCORPORATED 1974
SD0720'THE STATION WAS RECOVERED AS DESCRIBED. A LARGE, WOOD SIGN HAS BEEN
SD0720'CONSTRUCTED BY THE STATION.
SD0720'
SD0720'REFERENCE MARK NO. 1 HAS BEEN COVERED OVER BY A CONCRETE ADDITION
SD0720'TO THE DRIVEWAY MENTIONED IN THE NOTE ON PAGE 30 OF BOOK NO. 1152.
SD0720'
SD0720'REFERENCE MARK NO. 2 AND THE AZIMUTH MARK WERE RECOVERED AS
SD0720'DESCRIBED.
SD0720
SD0720   STATION RECOVERY (1997)
SD0720
SD0720'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0720'RECOVERED AS DESCRIBED. THE WOOD SIGN DESCRIBED IN THE 1974 RECOVERY
SD0720'NOTE IS PARTLY DOWN. TO REACH FROM HOQUIAM FOLLOW SR 109 WEST TO

SD0720'POWELL ROAD (JUST EAST OF THE HUMPTULIPS BRIDGE) . TURN NORTH ON TO
SD0720'POWELL ROAD AND PROCEED NORTH TO GRASS CREEK ROAD. TURN NORTHEAST AND
SD0720'FOLLOW TO THE INTERSECTION OF OCEAN BEACH ROAD AND GRASS CREEK ROAD.
SD0720'THE STATION IS WEST OF, AND 5 FT (1.5 M) HIGHER THAN, THE ROAD.

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1        National Geodetic Survey,   Retrieval Date = FEBRUARY  3, 1999
 AH7003 ***********************************************************************
 AH7003  DESIGNATION -  NERR NERR
 AH7003  PID         -  AH7003
 AH7003  STATE/COUNTY-  WA/GRAYS HARBOR
 AH7003  USGS QUAD   -  POINT BROWN (1984)
 AH7003
 AH7003                         *CURRENT SURVEY CONTROL
 AH7003  ______________________________________________________________________
 AH7003* NAD 83(1991)-  46 55 58.26881(N)    124 09 22.88730(W)     ADJUSTED
 AH7003* NAVD 88     -         7.42   (meters)      24.3    (feet)  GPS OBS
 AH7003  ______________________________________________________________________
 AH7003  X           -  -2,449,694.714 (meters)                     COMP
 AH7003  Y           -  -3,610,528.981 (meters)                     COMP
 AH7003  Z           -   4,636,657.970 (meters)                     COMP
 AH7003  LAPLACE CORR-          10.47  (seconds)                    DEFLEC96
 AH7003  ELLIP HEIGHT-         -17.30  (meters)                     GPS OBS
 AH7003  GEOID HEIGHT-         -24.56  (meters)                     GEOID96
 AH7003
 AH7003  HORZ ORDER  -  FIRST
 AH7003  ELLP ORDER  -  THIRD     CLASS II
 AH7003
 AH7003.The horizontal coordinates were established by GPS observations
 AH7003.and adjusted by the National Geodetic Survey in January 1999.
 AH7003
 AH7003.The orthometric height was determined by GPS observations and a
 AH7003.high-resolution geoid model using precise GPS observation and
 AH7003.processing techniques.
 AH7003
 AH7003.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7003
 AH7003.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7003
 AH7003.The ellipsoidal height was determined by GPS observations
 AH7003.and is referenced to NAD 83.
 AH7003
 AH7003.The geoid height was determined by GEOID96.
 AH7003
 AH7003;                    North         East     Units   Scale      Converg.
 AH7003;SPC WA S     -   184,240.742   221,682.225   MT  0.99993300 -2 39 21.5
 AH7003;UTM  10      - 5,198,351.244   411,977.564   MT  0.99969523 -0 50 41.4
 AH7003
 AH7003                           SUPERSEDED SURVEY CONTROL
 AH7003
 AH7003.No superseded survey control is available for this station.
 AH7003
 AH7003_MARKER: DD = SURVEY DISK
 AH7003_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT (ROUND)
 AH7003_STAMPING: NERR NERR 1988
 AH7003_PROJECTION: FLUSH
 AH7003_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AH7003+STABILITY: SURFACE MOTION
 AH7003_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7003+SATELLITE: SATELLITE OBSERVATIONS - 1988
 AH7003
 AH7003  HISTORY     - Date     Condition        Recov. By
 AH7003  HISTORY     - 1988     MONUMENTED       USE
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AH7003  HISTORY     - 1997     GOOD             WADECO
AH7003  HISTORY     - 1999     DESTROYED        WADECO
AH7003
AH7003                          STATION DESCRIPTION
AH7003
AH7003'DESCRIBED BY US ENGINEERS 1988
AH7003'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .
AH7003'THE STATION IS LOCATED IN THE CITY OF OCEANS SHORES AT THE CITY SEWAGE
AH7003'TREATMENT PLANT.  FROM SR 115 AND POINT BROWN AVENUE IN OCEAN SHORES
AH7003'FOLLOW POINT BROWN AVENUE SOUTH TO CHANCE ALAMER ROAD.  TURN WEST AND
AH7003'FOLLOW CHANCE ALAMER ROAD TO OCEAN SHORES BOULEVARD SW. TURN SOUTH AND
AH7003'FOLLOW OCEAN SHORES BOULEVARD SW SOUTH TO JETTY. CONTINUE EAST ALONG
AH7003'JETTY ON OCEAN SHORES BOULEVARD E TO SEWAGE TREATMENT PLANT AND
AH7003'STATION ON RIGHT.  PASS THROUGH GATE AND CHECK IN AT PLANT OFFICE.
AH7003'THE STATION IS ABOUT 100 M (328.1 FT) (210 DEGREES GRID) FROM THE
AH7003'TALLER OF TWO COE HYDROGRAPHIC SIGNAL TOWERS THAT ARE ON-LINE WITH THE
AH7003'STATION, 14 M (45.9 FT) SOUTHEAST OF THE EAST EDGE OF THE SOUTHEAST
AH7003'MOST OF THREE WATER TREATMENT PONDS, 26.8 M (87.9 FT) (110 DEGREES
AH7003'GRID) FROM CEMENT STEPS LEADING TO A 1 M (3.3 FT) TALL CEMENT BASE
AH7003'WITH THREE LARGE SEWAGE CONTROL VALVES, AND 0.7 M (2.3 FT) SOUTHWEST
AH7003'OF A METAL U.S.  ARMY CORP OF ENGINEERS WITNESS POST.  THE STATION IS
AH7003'A ARMY CORP OF ENGINEERS BRASS SURVEY DISK.  THE DISK IS STAMPED NERR
AH7003'NERR 1988.
AH7003
AH7003                          STATION RECOVERY (1997)
AH7003
AH7003'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
AH7003'RECOVERED AS DESCRIBED.
AH7003
AH7003                          STATION RECOVERY (1999)
AH7003
AH7003'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7003'STATION DESTROYED DURING THE CONSTRUCTION OF A RETAINING WALL.
AH7003'THE WALL IS TO PREVENT FLOODING DURING HIGH TIDE CONDITIONS ORIGINATING
AH7003'FROM THE SMALL BAY EAST OF THE SEWAGE TREATMENT PLANT.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0854 ***********************************************************************
 SD0854  CBN         -  This is a Cooperative Base Network Control Station.
 SD0854  DESIGNATION -  NORTH HEAD RM 4
 SD0854  PID         -  SD0854
 SD0854  STATE/COUNTY-  WA/PACIFIC
 SD0854  USGS QUAD   -  CAPE DISAPPOINTMENT (1985)
 SD0854
 SD0854                        *CURRENT SURVEY CONTROL
 SD0854  ______________________________________________________________________
 SD0854* NAD 83(1991)-  46 18 01.27675(N)    124 04 33.35756(W)     ADJUSTED
 SD0854* NAVD 88     -        77.69   (meters)     254.9    (feet)  GPS OBS
 SD0854  ______________________________________________________________________
 SD0854  X           -  -2,473,282.197 (meters)                     COMP
 SD0854  Y           -  -3,656,329.904 (meters)                     COMP
 SD0854  Z           -   4,588,414.682 (meters)                     COMP
 SD0854  LAPLACE CORR-          14.49  (seconds)                    DEFLEC96
 SD0854  ELLIP HEIGHT-          53.31  (meters)                     GPS OBS
 SD0854  GEOID HEIGHT-         -24.25  (meters)                     GEOID96
 SD0854
 SD0854  HORZ ORDER  -  B
 SD0854  ELLP ORDER  -  THIRD     CLASS II
 SD0854
 SD0854.The horizontal coordinates were established by GPS observations
 SD0854.and adjusted by the National Geodetic Survey in February 1991.
 SD0854
 SD0854.The orthometric height was determined by GPS observations and a
 SD0854.high-resolution geoid model using precise GPS observation and
 SD0854.processing techniques.
 SD0854
 SD0854.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0854
 SD0854.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0854
 SD0854.The ellipsoidal height was determined by GPS observations
 SD0854.and is referenced to NAD 83.
 SD0854
 SD0854.The geoid height was determined by GEOID96.
 SD0854
 SD0854;                    North         East     Units   Scale      Converg.
 SD0854;SPC WA S     -   113,727.376   224,613.608   MT  0.99992688 -2 35 51.2
 SD0854;SPC OR N     -   298,778.457 2,224,564.180   MT  1.00009031 -2 32 09.6
 SD0854;UTM  10      - 5,127,982.335   417,140.197   MT  0.99968440 -0 46 40.5
 SD0854
 SD0854                          SUPERSEDED SURVEY CONTROL
 SD0854
 SD0854  ELLIP HT    -          53.52  (m)                      GP(       ) 4 1
 SD0854  NAD 83(1986)-  46 18 01.28257(N)    124 04 33.32974(W) AD(       ) 2
 SD0854  NGVD 29     -        76.69   (m)          251.6    (f) LEVELING    3
 SD0854
 SD0854.Superseded values are not recommended for survey control.
 SD0854.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
 SD0854.See file dsdata.txt to determine how the superseded data were derived.
 SD0854
 SD0854_MARKER: DR = REFERENCE MARK DISK
 SD0854_SETTING: 36 = SET INTO A CONCRETE BUNKER
 SD0854_STAMPING: NORTH HEAD 1942 NO 4 1987
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SD0854_PROJECTION: FLUSH
SD0854_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0854_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
SD0854_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SD0854+SATELLITE: SATELLITE OBSERVATIONS - February 13, 1991
SD0854
SD0854 HISTORY   - Date   Condition   Recov. By
SD0854 HISTORY   - 1987   MONUMENTED   NGS
SD0854 HISTORY   - 1987   GOOD   NGS
SD0854 HISTORY   - 19890727 GOOD   NGS
SD0854 HISTORY   - 19900524 GOOD
SD0854 HISTORY   - 19910213 GOOD   NGS
SD0854 HISTORY   - 19970725 GOOD   WADECO
SD0854
SD0854   STATION DESCRIPTION
SD0854
SD0854'DESCRIBED BY NATIONAL GEODETIC SURVEY 1987 (DAW)
SD0854'THE STATION IS LOCATED ABOUT 3.2 KM (2 MI) SOUTHWEST OF ILWACO,
SD0854'0.3 KM (0.2 MI) NORTHEAST OF THE NORTH HEAD LIGHT HOUSE, AT THE WEST
SD0854'EDGE OF CAPE DISAPOINTMENT AND ON PROPERTY CONTROLLED BY THE PARK
SD0854'SERVICE.
SD0854'
SD0854'TO REACH THE STATION FROM THE INTERSECTION OF FIRST STREET AND
SD0854'SPRUCE STREET IN ILWACO GO WEST FOR 1 BLOCK. CONTINUE AHEAD ON THE
SD0854'FORT CANBY STATE PARK-NORTH HEAD ROAD FOR 3.54 KM (2.2 MI) TO A SIDE
SD0854'ROAD RIGHT. TURN RIGHT ON THE NORTH HEAD LIGHT HOUSE ROAD FOR
SD0854'0.64 KM (0.4 MI) TO A SIDE ROAD RIGHT, TURN RIGHT ON THE NARROW
SD0854'ROAD FOR 0.48 KM (0.3 MI) TO AN ANTENNA SITE AND THE STATION ON THE
SD0854'HIGHEST ONE OF THE THREE ROOF LINES OF THE CONCRETE BUNKER.
SD0854'
SD0854'THE STATION MARK IS A STANDARD NGS REFERENCE MARK DISK STAMPED---
SD0854'---NORTH HEAD 1942 NO 4 1987---SET IN A DRILL HOLE ON THE HIGHEST
SD0854'ROOF LEVEL OF THE CONCRETE BUNKER. IT IS1.2 M (4 FT) SOUTH OF THE
SD0854'NORTH EDGE OF THE ROOF AND 1.1 M (3.5 FT) EAST OF THE WEST EDGE OF
SD0854'THE ROOF.
SD0854'
SD0854'THIS STATION WAS ESTABLISHED FOR BETTER GPS VISABILITY AND CONVENTIO
SD0854'CONVENTIONALLY TIED TO STATIONS NORTH HEAD 1942 AND NORTH HEAD RM 3
SD0854'1976, LEVELS HAVE BEEN RUN TO THIS POINT.
SD0854'
SD0854'DESCRIBED BY DA WEGENAST.
SD0854
SD0854   STATION RECOVERY (1987)
SD0854
SD0854'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1987
SD0854'RECOVERED IN GOOD CONDITION.
SD0854
SD0854   STATION RECOVERY (1989)
SD0854
SD0854'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1989
SD0854'THE STATION IS LOCATED ABOUT 3.2 KM (2 MI) SOUTHWEST OF ILWACO,
SD0854'0.3 KM (0.2 MI) NORTHEAST OF THE NORTH HEAD LIGHT HOUSE, AT THE WEST
SD0854'EDGE OF CAPE DISAPOINTMENT AND ON PROPERTY CONTROLLED BY THE PARK
SD0854'SERVICE.
SD0854'TO REACH THE STATION FROM THE INTERSECTION OF FIRST STREET AND
SD0854'SPRUCE STREET IN ILWACO GO WEST FOR 1 BLOCK. CONTINUE AHEAD ON THE
SD0854'FORT CANBY STATE PARK-NORTH HEAD ROAD FOR 3.54 KM (2.2 MI) TO A SIDE

SD0854'ROAD RIGHT. TURN RIGHT ON THE NORTH HEAD LIGHT HOUSE ROAD FOR
SD0854'0.64 KM (0.4 MI) TO A SIDE ROAD RIGHT, TURN RIGHT ON THE NARROW
SD0854'ROAD FOR 0.48 KM (0.3 MI) TO AN ANTENNA SITE AND THE STATION ON THE
SD0854'HIGHEST ONE OF THE THREE ROOF LINES OF THE CONCRETE BUNKER.
SD0854'THE STATION MARK IS A STANDARD NGS REFERENCE MARK DISK STAMPED---
SD0854'---NORTH HEAD 1942 NO 4 1987---SET IN A DRILL HOLE ON THE HIGHEST
SD0854'ROOF LEVEL OF THE CONCRETE BUNKER. IT IS1.2 M (4 FT) SOUTH OF THE
SD0854'NORTH EDGE OF THE ROOF AND 1.1 M (3.5 FT) EAST OF THE WEST EDGE OF
SD0854'THE ROOF.
SD0854'THE STATE PARKS DEPARTMENT PLAN ON LOCKING
SD0854'THE GATE AT NIGHT. CALL LARRY CHATMAN AT 206 642-3078 FOR A KEY.
SD0854'ALSO PACIFIC COUNTY WILL HAVE A KEY.
SD0854
SD0854   STATION RECOVERY (1990)
SD0854
SD0854'RECOVERED 1990
SD0854'RECOVERED IN GOOD CONDITION.
SD0854
SD0854   STATION RECOVERY (1991)
SD0854
SD0854'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1991
SD0854'THE STATION IS LOCATED ABOUT 57.9 KM (36.0 MI) SOUTHWEST OF SOUTH
SD0854'BEND, 32.2 KM (20.0 MI) WEST OF ROSBURG, 20.9 KM (13.0 MI) NORTHWEST
SD0854'OF ASTORIA, 3.2 KM (2.0 MI) SOUTHWEST OF ILWACO, 0.3 KM (0.2 MI)
SD0854'NORTHEAST OF THE NORTH HEAD LIGHT HOUSE AND ON PROPERTY CONTROLLED BY
SD0854'THE STATE PARK SERVICE. THE GATE MAY BE LOCKED AFTER DARK, CONTACT
SD0854'MR LARRY CHAPMAN, AREA DIRECTOR FOR THE STATE PARK, PO BOX 488,
SD0854'ILWACO 98624-0488, PHONE 206-642-3078.
SD0854'TO REACH FROM THE INTERSECTION OF FIRST STREET AND SPRUCE STREET IN
SD0854'ILWACO, GO WEST FOR 1 BLOCK TO A CROSS STREET. CONTINUE AHEAD ON THE
SD0854'FORT CANBY STATE PARK-NORTH HEAD ROAD FOR 3.54 KM (2.20 MI) TO A SIDE
SD0854'ROAD RIGHT. TURN RIGHT AND GO NORTH ON THE NORTH HEAD LIGHT HOUSE
SD0854'ROAD FOR 0.64 KM (0.40 MI) TO A SIDE ROAD RIGHT. TURN RIGHT ON THE
SD0854'NARROW ROAD FOR 0.48 KM (0.30 MI) TO AN ANTENNA SITE AND THE STATION
SD0854'ABOUT 25 PACES WEST OF THE FENCE AND ON THE HIGHEST ROOF LINE OF A
SD0854'CONCRETE BUNKER.
SD0854'THE MARK IS SET IN A DRILL HOLE IN THE ROOF OF THE CONCRETE BUNKER. IT
SD0854'IS 1.2 M (3.9 FT) SOUTH OF THE NORTH SIDE OF THE ROOF AND 1.1 M
SD0854'(3.6 FT) EAST OF THE WEST EDGE OF THE ROOF.
SD0854
SD0854   STATION RECOVERY (1997)
SD0854
SD0854'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0854'RECOVERED AS DESCRIBED.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH6993 ***********************************************************************
 AH6993  DESIGNATION -  OMEN
 AH6993  PID         -  AH6993
 AH6993  STATE/COUNTY-  WA/GRAYS HARBOR
 AH6993  USGS QUAD   -  WESTPORT (1984)
 AH6993
 AH6993                         *CURRENT SURVEY CONTROL
 AH6993  ______________________________________________________________________
 AH6993* NAD 83(1991)-  46 56 43.43749(N)    124 06 25.44707(W)     ADJUSTED
 AH6993* NAVD 88     -         4.59   (meters)      15.1    (feet)  GPS OBS
 AH6993  ______________________________________________________________________
 AH6993  X           -  -2,446,015.376 (meters)                     COMP
 AH6993  Y           -  -3,611,789.713 (meters)                     COMP
 AH6993  Z           -   4,637,608.400 (meters)                     COMP
 AH6993  LAPLACE CORR-          11.81  (seconds)                    DEFLEC96
 AH6993  ELLIP HEIGHT-         -19.93  (meters)                     GPS OBS
 AH6993  GEOID HEIGHT-         -24.36  (meters)                     GEOID96
 AH6993
 AH6993  HORZ ORDER  -  FIRST
 AH6993  ELLP ORDER  -  THIRD     CLASS II
 AH6993
 AH6993.The horizontal coordinates were established by GPS observations
 AH6993.and adjusted by the National Geodetic Survey in January 1999.
 AH6993
 AH6993.The orthometric height was determined by GPS observations and a
 AH6993.high-resolution geoid model using precise GPS observation and
 AH6993.processing techniques.
 AH6993
 AH6993.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH6993
 AH6993.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH6993
 AH6993.The ellipsoidal height was determined by GPS observations
 AH6993.and is referenced to NAD 83.
 AH6993
 AH6993.The geoid height was determined by GEOID96.
 AH6993
 AH6993;                    North         East     Units   Scale      Converg.
 AH6993;SPC WA S     -   185,461.276   225,495.170   MT  0.99993435 -2 37 12.6
 AH6993;UTM  10      - 5,199,691.352   415,749.114   MT  0.99968724 -0 48 32.4
 AH6993
 AH6993                           SUPERSEDED SURVEY CONTROL
 AH6993
 AH6993.No superseded survey control is available for this station.
 AH6993
 AH6993_MARKER: DD = SURVEY DISK
 AH6993_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 AH6993_STAMPING: OMEN 1988
 AH6993_PROJECTION: FLUSH
 AH6993_MAGNETIC: O = OTHER; SEE DESCRIPTION
 AH6993_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AH6993+STABILITY: SURFACE MOTION
 AH6993_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH6993+SATELLITE: SATELLITE OBSERVATIONS - 1997
 AH6993
 AH6993  HISTORY     - Date     Condition        Recov. By
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AH6993  HISTORY     - 1997     MONUMENTED       WADECO
AH6993
AH6993                          STATION DESCRIPTION
AH6993
AH6993'DESCRIBED BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
AH6993'DESCRIBED BY WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .  THE
AH6993'STATION IS LOCATED AT DAMON POINT STATE PARK IN THE CITY OF OCEAN
AH6993'SHORES APPROXMIATELY 7 KM (4.35 MI) N OF WESTPORT 48 KM (29.80 MI)
AH6993'SOUTH OF TAHOLAH AND 18 KM (11.20 MI) W OF HOQUIM.  TO REACH STATION
AH6993'FROM THE INTERSECTION OF POINT BROWN AVENUE AND SR 115 IN OCEAN SHORES
AH6993'GO SOUTH ON POINT BROWN AVENUE TO THE OCEAN SHORES MARINA.  GO
AH6993'SOUTHWEST ON MARINE VIEW DRIVE 0.15 MILES (0.24 KM) FROM THE MARINA TO
AH6993'THE ENTRANCE TO DAMON POINT STATE PARK.  TURN LEFT AND FOLLOW THE
AH6993'GRAVEL PARK ROAD SOUTHEAST 1.3 MILES (2.1 KM) TO THE END OF THE ROAD
AH6993'AND A GRAVEL PARKING AREA WITH 2 WOOD FRAME BATHROOMS ON THE LEFT AND
AH6993'A SMALL TRIANGULAR SHAPED TRAFFIC ISLAND ON THE SOUTHEAST CORNER OF
AH6993'LOT.  THE STATION IS 90 METERS, (295.3 FT) 94 DEGREES GRID, FROM THE
AH6993'CENTER OF THE TRIANGULAR SHAPED TRAFFIC ISLAND, 24 METERS, (78.7 FT)
AH6993'70 DEGREES GRID, FROM A 1.5 METER (4.9 FT) TALL 0.5 METER (1.6 FT)
AH6993'DIAMETER STUMP, 16 METERS (52.5 FT) WEST OF THE ORDINARY HIGH WATER
AH6993'LINE, 5 METERS (16.4 FT) WEST OF THE STORM HIGH WATER LINE, AND 0.3
AH6993'METERS (1.0 FT) SOUTH OF A PLASTIC WITNESS POST.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0531 ***********************************************************************
 SD0531  DESIGNATION -  OYSTER 3
 SD0531  PID         -  SD0531
 SD0531  STATE/COUNTY-  WA/PACIFIC
 SD0531  USGS QUAD   -  OYSTERVILLE (1985)
 SD0531
 SD0531                         *CURRENT SURVEY CONTROL
 SD0531  ______________________________________________________________________
 SD0531* NAD 83(1991)-  46 32 50.26826(N)    124 03 34.82961(W)     ADJUSTED
 SD0531* NAVD 88     -         8.29   (meters)      27.2    (feet)  GPS OBS
 SD0531  ______________________________________________________________________
 SD0531  X           -  -2,461,080.335 (meters)                     COMP
 SD0531  Y           -  -3,640,516.968 (meters)                     COMP
 SD0531  Z           -   4,607,286.275 (meters)                     COMP
 SD0531  LAPLACE CORR-          15.66  (seconds)                    DEFLEC96
 SD0531  ELLIP HEIGHT-         -16.02  (meters)                     GPS OBS
 SD0531  GEOID HEIGHT-         -24.17  (meters)                     GEOID96
 SD0531
 SD0531  HORZ ORDER  -  FIRST
 SD0531  ELLP ORDER  -  THIRD     CLASS II
 SD0531
 SD0531.The horizontal coordinates were established by GPS observations
 SD0531.and adjusted by the National Geodetic Survey in January 1999.
 SD0531
 SD0531.The orthometric height was determined by GPS observations and a
 SD0531.high-resolution geoid model using precise GPS observation and
 SD0531.processing techniques.
 SD0531
 SD0531.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0531
 SD0531.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0531
 SD0531.The ellipsoidal height was determined by GPS observations
 SD0531.and is referenced to NAD 83.
 SD0531
 SD0531.The geoid height was determined by GEOID96.
 SD0531
 SD0531;                    North         East     Units   Scale      Converg.
 SD0531;SPC WA S     -   141,090.565   227,103.068   MT  0.99991481 -2 35 08.6
 SD0531;UTM  10      - 5,155,404.239   418,759.921   MT  0.99968112 -0 46 09.5
 SD0531
 SD0531:                Primary Azimuth Mark                    Grid Az
 SD0531:SPC WA S     -  041 PACIFIC CO 1977                     000 12 37.5
 SD0531:UTM  10      -  041 PACIFIC CO 1977                     358 23 38.4
 SD0531
 SD0531|---------------------------------------------------------------------|
 SD0531| PID    Reference Object                    Distance      Geod. Az   |
 SD0531|                                                          dddmmss.s |
 SD0531|        OYSTER 3 RM 3                       15.987 METERS 00247     |
 SD0531|        OYSTER 3 RM 4                       21.766 METERS 08920     |
 SD0531| SD0532 041 PACIFIC CO 1977                422.672 METERS 3573728.9 |
 SD0531|---------------------------------------------------------------------|
 SD0531
 SD0531                          SUPERSEDED SURVEY CONTROL
 SD0531
 SD0531  NAD 83(1991)-  46 32 50.26289(N)    124 03 34.82917(W) AD(       ) 2
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SD0531  NAD 83(1991)-  46 32 50.26207(N)    124 03 34.82853(W) AD(       ) 2
SD0531  NAD 83(1986)-  46 32 50.26227(N)    124 03 34.81076(W) AD(       ) 2
SD0531  NAD 27      -  46 32 50.90603(N)    124 03 30.21696(W) AD(       ) 2
SD0531  NGVD 29     -         7.8    (m)           26.     (f) VERT ANG
SD0531
SD0531.Superseded values are not recommended for survey control.
SD0531.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0531.See file dsdata.txt to determine how the superseded data were derived.
SD0531
SD0531_MARKER: DS = TRIANGULATION STATION DISK
SD0531_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
SD0531_STAMPING: OYSTER 3 1976
SD0531_PROJECTION: FLUSH
SD0531_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0531_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0531+STABILITY: SURFACE MOTION
SD0531
SD0531  HISTORY     - Date     Condition        Recov. By
SD0531  HISTORY     - 1976     MONUMENTED       NGS
SD0531  HISTORY     - 19971015 GOOD             WADECO
SD0531
SD0531                          STATION DESCRIPTION
SD0531
SD0531'DESCRIBED BY NATIONAL GEODETIC SURVEY 1976 (CLN)
SD0531'THIS STATION WAS ESTABLISHED TO REPLACE OYSTER 2 1926.
SD0531'
SD0531'STATION IS LOCATED ON THE OCEAN BEACH 400 FEET SOUTHWEST OF THE BEACH
SD0531'APPROACH ROAD AND ON THE HIGHEST POINT OF THE WESTERLY MOST SAND
SD0531'DUNE.
SD0531'
SD0531'TO REACH FROM THE OYSTERVILLE STORE AND POST OFFICE PROCEED WEST .22
SD0531'MILE TO A PAVED INTERSECTION CONTINUE STRAIGHT .11 MILE TO AN
SD0531'INTERSECTION THEN CONTINUE WEST ON PAVED ROAD .10 MILE, CONTINUE
SD0531'STRAIGHT .58 MILE TO THE INTERSECTION OF I ST. AND OYSTERVILLE
SD0531'ROAD.  CONTINUE STRAIGHT .20 MILE AND THE END OF TWO WHEEL DRIVE
SD0531'TRUCK TRAVEL AND THE HIGHER HIGH WATER EDGE AT THE BEACH, CONTINUE ON
SD0531'FOOT 400 FEET SOUTHWEST ALONG THE WESTERLY SAND DUNE TO THE
SD0531'STATION.
SD0531'
SD0531'THE STATION MARK STAMPED OYSTER 3 1976 IS A STANDARD DISK SET IN AN
SD0531'8 INCH DIAMETER CONCRETE MASS.  IT IS 152.5 FEET WEST OF THE
SD0531'SOUTHWEST CONCRETE FOUNDATION CORNER TO A 4-UNIT CONDOMINIUM.
SD0531'
SD0531'THE SUBSURFACE MARK IS A STANDARD DISK STAMPED OYSTER 3 1976 SET IN
SD0531'AN IRREGULAR MASS OF CONCRETE 4 FEET BELOW THE GROUND SURFACE.
SD0531'
SD0531'REFERENCE MARK NO. 3 STAMPED OYSTER 3 NO 3 1976 IS A STANDARD DISK
SD0531'SET IN AN 8 INCH DIAMETER CONCRETE POST NORTH OF THE STATION.
SD0531'
SD0531'REFERENCE MARK NO. 4 STAMPED OYSTER 3 NO 4 1976 IS A STANDARD DISK
SD0531'SET IN AN 8 INCH DIAMETER CONCRETE POST EAST OF THE STATION.  IT IS
SD0531'81.22 FEET WEST OF THE SOUTHWEST CORNER OF A 4-UNIT CONDOMINIUM AND
SD0531'82.45 FEET WEST-NORTHWEST OF THE NORTHWEST CORNER OF THE 2-UNIT
SD0531'CONDOMINIUM SOUTH OF THE 4-UNIT.
SD0531'
SD0531'NEAREST TOWN--OYSTERVILLE.
SD0531
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SD0531                          STATION RECOVERY (1997)
SD0531
SD0531'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0531'RECOVERED AS DESCRIBED.  A WITNESS POST IS WITHIN 1 M (3.3 FT) OF THE
SD0531'STATION.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7026 ***********************************************************************
 AH7026  DESIGNATION -  PC 004
 AH7026  PID         -  AH7026
 AH7026  STATE/COUNTY-  WA/PACIFIC
 AH7026  USGS QUAD   -  CAPE DISAPPOINTMENT (1985)
 AH7026
 AH7026                        *CURRENT SURVEY CONTROL
 AH7026  ______________________________________________________________________
 AH7026* NAD 83(1991)-  46 18 49.19074(N)    124 04 08.55166(W)     ADJUSTED
 AH7026* NAVD 88     -         7.25   (meters)      23.8    (feet)  GPS OBS
 AH7026  ______________________________________________________________________
 AH7026  X           -  -2,472,215.960 (meters)                     COMP
 AH7026  Y           -  -3,655,700.906 (meters)                     COMP
 AH7026  Z           -   4,589,385.750 (meters)                     COMP
 AH7026  LAPLACE CORR-          14.53  (seconds)                    DEFLEC96
 AH7026  ELLIP HEIGHT-         -17.12  (meters)                     GPS OBS
 AH7026  GEOID HEIGHT-         -24.22  (meters)                     GEOID96
 AH7026
 AH7026  HORZ ORDER  -  FIRST
 AH7026  ELLP ORDER  -  THIRD     CLASS II
 AH7026
 AH7026.The horizontal coordinates were established by GPS observations
 AH7026.and adjusted by the National Geodetic Survey in January 1999.
 AH7026
 AH7026.The orthometric height was determined by GPS observations and a
 AH7026.high-resolution geoid model using precise GPS observation and
 AH7026.processing techniques.
 AH7026
 AH7026.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7026
 AH7026.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7026
 AH7026.The ellipsoidal height was determined by GPS observations
 AH7026.and is referenced to NAD 83.
 AH7026
 AH7026.The geoid height was determined by GEOID96.
 AH7026
 AH7026;                    North         East     Units   Scale      Converg.
 AH7026;SPC WA S     -   115,181.161   225,210.806   MT  0.99992576 -2 35 33.1
 AH7026;UTM  10      - 5,129,453.991   417,690.801   MT  0.99968328 -0 46 23.2
 AH7026
 AH7026                          SUPERSEDED SURVEY CONTROL
 AH7026
 AH7026.No superseded survey control is available for this station.
 AH7026
 AH7026_MARKER: DD = SURVEY DISK
 AH7026_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 AH7026_STAMPING: STA 004
 AH7026_PROJECTION: FLUSH
 AH7026_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
 AH7026_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AH7026+STABILITY: SURFACE MOTION
 AH7026
 AH7026  HISTORY     - Date     Condition        Recov. By
 AH7026  HISTORY     - 1976     MONUMENTED       WA-049
 AH7026  HISTORY     - 19990419 GOOD             WADECO
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AH7026
AH7026 STATION DESCRIPTION
AH7026
AH7026'DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (JOT)
AH7026'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) TO
AH7026'REACH FROM SR 103/SR 101 AND 38TH PLACE PROCEED WEST 0.55 MILES (0.89
AH7026'KM) TO THE OCEAN BEACH. PROCEED SOUTH FROM THE BEACH ACCESS 1.21
AH7026'MILES (1.95 KM) . PARK VEHICLE ABOVE THE HIGH TIDE LINE AND PROCEED
AH7026'ABOUT 80 M (262.5 FT) EAST TO STATION ON TOP OF A VEGETATED DUNE. THE
AH7026'STATION IS A STANDARD PACIFIC COUNTY SURVEY DISK SET FLUSH IN A ROUND
AH7026'CONCRETE MONUMENT. THE UNDERGROUND MARK IS A 5/8 INCH REBAR SET IN
AH7026'CONCRETE 2.5 FT (0.8 M) BELOW THE SURFACE MARK. RM 1 AND RM 3 ARE
AH7026'STANDARD PACIFIC COUNTY SURVEY DISKS SET IN CONCRETE WITH WITNESS
AH7026'POSTS IN LINE WITH THE STATION. A 2 INCH PIPE PROJECTING 3 FT (0.9 M)
AH7026'MARKS THE BASED OF THE SEAWARD MOST VEGETATED DUNE AND IS ABOUT 80 M,
AH7026'(262.5 FT) 277 DEGREES GRID, OF THE STATION. THE STATION IS STAMPED
AH7026'STA 004. A ORANGE NGS WITNESS POST AND A STEEL WITNESS POST ARE
AH7026'WITHIN 1 M (3.3 FT) OF THE STATION. REFERENCE MARK 1 IS STAMPED STA
AH7026'004 RM 1. RM 1 IS 18.34 M, (60.17 FT) 22 DEGREES GRID, FROM THE
AH7026'STATION. REFERENCE MARK 2 HAS BEEN DESTROYED. REFERENCE MARK 3 IS
AH7026'STAMPED STA 004 RM 3. RM 3 IS ABOUT 20 M, (65.6 FT) 120 DEGREES, FROM
AH7026'THE STATION. THE 2 INCH DIAMETER PIPE IS ABOUT 100 M, (328.1 FT) 277
AH7026'DEGREES GRID, FROM THE STATION.
AH7026
AH7026 STATION RECOVERY (1999)
AH7026
AH7026'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7026'RECOVERED AS DESCRIBED.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7024 ***********************************************************************
 AH7024  DESIGNATION -  PC 008
 AH7024  PID         -  AH7024
 AH7024  STATE/COUNTY-  WA/PACIFIC
 AH7024  USGS QUAD   -  CAPE DISAPPOINTMENT (1985)
 AH7024
 AH7024                        *CURRENT SURVEY CONTROL
 AH7024  ______________________________________________________________________
 AH7024* NAD 83(1991)-  46 20 40.74063(N)    124 03 47.18604(W)     ADJUSTED
 AH7024* NAVD 88     -         7.42   (meters)      24.3    (feet)  GPS OBS
 AH7024  ______________________________________________________________________
 AH7024  X           -  -2,470,441.928 (meters)                     COMP
 AH7024  Y           -  -3,653,893.186 (meters)                     COMP
 AH7024  Z           -   4,591,764.247 (meters)                     COMP
 AH7024  LAPLACE CORR-          14.93  (seconds)                    DEFLEC96
 AH7024  ELLIP HEIGHT-         -16.93  (meters)                     GPS OBS
 AH7024  GEOID HEIGHT-         -24.20  (meters)                     GEOID96
 AH7024
 AH7024  HORZ ORDER  -  FIRST
 AH7024  ELLP ORDER  -  THIRD     CLASS II
 AH7024
 AH7024.The horizontal coordinates were established by GPS observations
 AH7024.and adjusted by the National Geodetic Survey in January 1999.
 AH7024
 AH7024.The orthometric height was determined by GPS observations and a
 AH7024.high-resolution geoid model using precise GPS observation and
 AH7024.processing techniques.
 AH7024
 AH7024.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7024
 AH7024.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7024
 AH7024.The ellipsoidal height was determined by GPS observations
 AH7024.and is referenced to NAD 83.
 AH7024
 AH7024.The geoid height was determined by GEOID96.
 AH7024
 AH7024;                    North         East     Units   Scale      Converg.
 AH7024;SPC WA S     -   118,601.072   225,822.964   MT  0.99992336 -2 35 17.6
 AH7024;UTM  10      - 5,132,890.781   418,193.960   MT  0.99968226 -0 46 09.1
 AH7024
 AH7024                           SUPERSEDED SURVEY CONTROL
 AH7024
 AH7024.No superseded survey control is available for this station.
 AH7024
 AH7024_MARKER: DD = SURVEY DISK
 AH7024_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 AH7024_STAMPING: STA 008
 AH7024_PROJECTION: FLUSH
 AH7024_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
 AH7024_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AH7024+STABILITY: SURFACE MOTION
 AH7024_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7024+SATELLITE: SATELLITE OBSERVATIONS - 1976
 AH7024
 AH7024  HISTORY     - Date     Condition        Recov. By
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AH7024  HISTORY     - 1976     MONUMENTED       WA-049
AH7024  HISTORY     - 19990419 GOOD             WADECO
AH7024
AH7024                          STATION DESCRIPTION
AH7024
AH7024'DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (JOT)
AH7024'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) .  THE
AH7024'STATION IS LOCATED ON THE WESTERN MOST VEGETATED SAND DUNE IN THE CITY
AH7024'OF LONG BEACH.  FROM THE INTERSECTION OF SR 103 AND 10TH STREET SOUTH
AH7024'IN LONG BEACH GO WEST 0.4 MILES (0.6 KM) PAST THE EDGEWATER INN TO A
AH7024'PUBLIC RESTROOM LOCATED ABOUT 25 M (82.0 FT) SOUTH OF THE SOUTH END OF
AH7024'THE LONG BEACH BOARD WALK.  FROM THE RESTROOMS PROCEED SOUTH 152 M
AH7024'(498.7 FT) TO A HIGH VEGETATED DUNE AND STATION.  THE STATION IS
AH7024'SOUTHWEST OF THE EDGEWATER HOTEL.  THE STATION IS A STANDARD PACIFIC
AH7024'COUNTY SURVEY DISK SET FLUSH IN A ROUND CONCRETE MOUNUMENT. THE
AH7024'UNDERGROUND MARK CONSISTS OF A 5/8 INCH REBAR SET IN CONCRETE 2.5 FT
AH7024'(0.8 M) BELOW THE SURFACE.  REFERENCE MARK 1 AND 2 ARE STANDARD
AH7024'PACIFIC COUNTY SURVEY DISKS SET IN CONCRETE WITH WITNESS POSTS IN LINE
AH7024'WITH THE STATION.  A 2 INCH PIPE PROJECTING 6 FT (1.8 M) MARKS THE
AH7024'BASE OF THE SEAWARD MOST VEGETATED DUNE.  THE STATION IS STAMPED STA
AH7024'008.  A NGS ORANGE WITNESS POST IS 1.2 M (3.9 FT) EAST AND A STEEL
AH7024'WITNESS POST IS 1 M (3.3 FT) WEST OF THE STATION.  REFERENCE MARK 1 IS
AH7024'STAMPED STA 008 RM 1.  RM 1 IS 25.17 M, (82.58 FT) 12 DEGREES GRID,
AH7024'FROM THE STATION.  RM 1 IS 0.6 M (2.0 FT) BELOW GRADE AND 1.25 M (4.10
AH7024'FT) BELOW THE TOP OF THE STEEL WITNESS POST.  REFERENCE MARK 2 IS
AH7024'STAMPED STA 008 RM 2.  RM 2 IS 28.27 M, (92.75 FT) 98 DEGREES GRID,
AH7024'FROM THE STATION.  THE 2 INCH DIAMETER PIPE IS 33.8 M, (110.9 FT) 295
AH7024'DEGREES GRID, OF THE STATION.
AH7024
AH7024                          STATION RECOVERY (1999)
AH7024
AH7024'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7024'RECOVERED AS DESCRIBED.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7023 ***********************************************************************
 AH7023  DESIGNATION -  PC 014
 AH7023  PID         -  AH7023
 AH7023  STATE/COUNTY-  WA/PACIFIC
 AH7023  USGS QUAD   -  OCEAN PARK (1985)
 AH7023
 AH7023                        *CURRENT SURVEY CONTROL
 AH7023  ______________________________________________________________________
 AH7023* NAD 83(1991)-  46 23 08.68982(N)    124 03 32.37596(W)     ADJUSTED
 AH7023* NAVD 88     -         7.40   (meters)      24.3    (feet)  GPS OBS
 AH7023  ______________________________________________________________________
 AH7023  X           -  -2,468,327.892 (meters)                     COMP
 AH7023  Y           -  -3,651,331.423 (meters)                     COMP
 AH7023  Z           -   4,594,916.626 (meters)                     COMP
 AH7023  LAPLACE CORR-          15.43  (seconds)                    DEFLEC96
 AH7023  ELLIP HEIGHT-         -16.93  (meters)                     GPS OBS
 AH7023  GEOID HEIGHT-         -24.18  (meters)                     GEOID96
 AH7023
 AH7023  HORZ ORDER  -  FIRST
 AH7023  ELLP ORDER  -  THIRD     CLASS II
 AH7023
 AH7023.The horizontal coordinates were established by GPS observations
 AH7023.and adjusted by the National Geodetic Survey in January 1999.
 AH7023
 AH7023.The orthometric height was determined by GPS observations and a
 AH7023.high-resolution geoid model using precise GPS observation and
 AH7023.processing techniques.
 AH7023
 AH7023.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7023
 AH7023.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7023
 AH7023.The ellipsoidal height was determined by GPS observations
 AH7023.and is referenced to NAD 83.
 AH7023
 AH7023.The geoid height was determined by GEOID96.
 AH7023
 AH7023;                    North         East     Units   Scale      Converg.
 AH7023;SPC WA S     -   123,150.053   226,345.349   MT  0.99992062 -2 35 06.9
 AH7023;UTM  10      - 5,137,452.954   418,571.616   MT  0.99968150 -0 46 00.3
 AH7023
 AH7023                          SUPERSEDED SURVEY CONTROL
 AH7023
 AH7023.No superseded survey control is available for this station.
 AH7023
 AH7023_MARKER: DD = SURVEY DISK
 AH7023_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 AH7023_STAMPING: STA 014
 AH7023_PROJECTION: FLUSH
 AH7023_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
 AH7023_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AH7023+STABILITY: SURFACE MOTION
 AH7023_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7023+SATELLITE: SATELLITE OBSERVATIONS - 1976
 AH7023
 AH7023  HISTORY     - Date     Condition        Recov. By
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AH7023  HISTORY     - 1976     MONUMENTED       WA-049
AH7023  HISTORY     - 19990419 GOOD             WADECO
AH7023
AH7023                          STATION DESCRIPTION
AH7023
AH7023'DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (JOT)
AH7023'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) .  FROM
AH7023'THE INTERSECTION OF PIONEER ROAD AND SR 103 IN LONG BEACH PROCEED
AH7023'NORTH TO THE INTERSECTION WITH CRANBERRY ROAD.  TURN WEST AND PROCEED
AH7023'ALONG THE CRANBERRY ROAD BEACH ACCESS 0.3 MILES (0.5 KM) TO THE OCEAN
AH7023'BEACH.  GO SOUTH 0.66 MILES (1.06 KM) AND PARK VEHICLE ABOVE THE HIGH
AH7023'TIDE LINE.  FROM THE FIRST VEGETATED DUNE PROCEED EAST ABOUT 50 M
AH7023'(164.0 FT) TO THE STATION.  THE STATION IS A STANDARD PACIFIC COUNTY
AH7023'SURVEY DISK SET FLUSH WITH THE GROUND IN A ROUND CONCRETE MONUMENT.
AH7023'THE UNDERGROUND MARK CONSISTS OF 5/8 INCH REBAR IN CONCRETE 2.5 FT
AH7023'(0.8 M) BELOW THE SURFACE MARK.  REFERENCE MARK 1 AND 2 ARE STANDARD
AH7023'PACIFIC COUNTY SURVEY DISKS SET IN CONCRETE WITH WITNESS POSTS IN LINE
AH7023'WITH THE STATION.  A 2 INCH PIPE PROJECTING 6 FT (1.8 M) MARKS THE
AH7023'BASE OF THE SEAWARD MOST VEGETATED DUNE AND IS 49 M (160.8 FT) WEST OF
AH7023'THE STATION.  THE STATION IS STAMPED STA 014.  A STEEL WITNESS MOST IS
AH7023'ABOUT 1 M (3.3 FT) FROM THE STATION.  REFERENCE MARK 1 IS STAMPED STA
AH7023'014 RM 1.  RM 1 IS 26.64 M, (87.40 FT) 23 DEGREES GRID, FROM THE
AH7023'STATION.  REFERENCE MARK 2 IS STAMPED STA 014 RM 2.  RM 2 IS 28.26 M,
AH7023'(92.72 FT) 120 DEGREES GRID, FROM THE STATION.  THE 2 INCH DIAMETER
AH7023'PIPE IS 49 M, (160.8 FT) 270 DEGREES FROM THE STATION.
AH7023
AH7023                          STATION RECOVERY (1999)
AH7023
AH7023'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7023'RECOVERED AS DESCRIBED.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7022 ***********************************************************************
 AH7022  DESIGNATION -  PC 021
 AH7022  PID         -  AH7022
 AH7022  STATE/COUNTY-  WA/PACIFIC
 AH7022  USGS QUAD   -  OCEAN PARK (1985)
 AH7022
 AH7022                         *CURRENT SURVEY CONTROL
 AH7022  ______________________________________________________________________
 AH7022* NAD 83(1991)-  46 26 17.65792(N)    124 03 24.38101(W)     ADJUSTED
 AH7022* NAVD 88     -         8.69   (meters)      28.5    (feet)  GPS OBS
 AH7022  ______________________________________________________________________
 AH7022  X           -  -2,465,820.082 (meters)                     COMP
 AH7022  Y           -  -3,647,926.427 (meters)                     COMP
 AH7022  Z           -   4,598,940.519 (meters)                     COMP
 AH7022  LAPLACE CORR-          15.61  (seconds)                    DEFLEC96
 AH7022  ELLIP HEIGHT-         -15.63  (meters)                     GPS OBS
 AH7022  GEOID HEIGHT-         -24.17  (meters)                     GEOID96
 AH7022
 AH7022  HORZ ORDER  -  FIRST
 AH7022  ELLP ORDER  -  THIRD     CLASS II
 AH7022
 AH7022.The horizontal coordinates were established by GPS observations
 AH7022.and adjusted by the National Geodetic Survey in January 1999.
 AH7022
 AH7022.The orthometric height was determined by GPS observations and a
 AH7022.high-resolution geoid model using precise GPS observation and
 AH7022.processing techniques.
 AH7022
 AH7022.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7022
 AH7022.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7022
 AH7022.The ellipsoidal height was determined by GPS observations
 AH7022.and is referenced to NAD 83.
 AH7022
 AH7022.The geoid height was determined by GEOID96.
 AH7022
 AH7022;                    North         East     Units   Scale      Converg.
 AH7022;SPC WA S     -   128,970.830   226,778.995   MT  0.99991787 -2 35 01.0
 AH7022;UTM  10      - 5,143,283.171   418,820.306   MT  0.99968101 -0 45 56.9
 AH7022
 AH7022                           SUPERSEDED SURVEY CONTROL
 AH7022
 AH7022.No superseded survey control is available for this station.
 AH7022
 AH7022_MARKER: DD = SURVEY DISK
 AH7022_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 AH7022_STAMPING: STA 021
 AH7022_PROJECTION: FLUSH
 AH7022_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
 AH7022_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AH7022+STABILITY: SURFACE MOTION
 AH7022_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7022+SATELLITE: SATELLITE OBSERVATIONS - 1976
 AH7022
 AH7022  HISTORY     - Date     Condition        Recov. By
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AH7022 HISTORY   - 1976   MONUMENTED   WA-049
AH7022 HISTORY   - 19990419 GOOD   WADECO
AH7022
AH7022   STATION DESCRIPTION
AH7022
AH7022'DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (JOT)
AH7022'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) . THE
AH7022'STATION IS ON THE WESTERN SIDE OF THE LONG BEACH PENINSULA, ABOUT 5.5
AH7022'MILES (8.9 KM) NORTH OF LONG BEACH AND 3.8 MILES (6.1 KM) SOUTH OF
AH7022'OCEAN PARK, IN THE AREA LOCALLY CALLED KLIPSAN BEACH. TO REACH FROM
AH7022'THE INTERSECTION OF SR 103 AND BAY AVENUE IN THE CITY OF OCEAN PARK GO
AH7022'SOUTH 1.85 MILES (2.98 KM) TO A BEACH ACCESS SIGN (KLIPSAN BEACH) AND
AH7022'225TH STREET. GO WEST ON 225TH ABOUT 0.25 MILES (0.40 KM) TO BEACH
AH7022'AND TURN SOUTH. PROCEED SOUTH ON BEACH 1.85 MILES. (2.98 KM) TURN
AH7022'EAST AND PROCEED ABOUT 100 M (328.1 FT) EAST ON A PRIVATE BEACH ACCESS
AH7022'ROAD TO A HIGH GRASSED DUNE ON LEFT AND STATION. THE STATION IS
AH7022'LOCATED BETWEEN 187TH AND 188TH PLACE OF OFF SR 103. THE STATION IS A
AH7022'STANDARD PACIFIC COUNTY SURVEY DISK SET FLUSH WITH THE GROUND IN A
AH7022'ROUND CONCRETE MONUMENT. THE UNDERGROUND MARK CONSISTS OF A 5/8 INCH
AH7022'REBAR SET IN CONCRETE 2.5 FT (0.8 M) BELOW THE SURFACE MARK. THE
AH7022'STATION HAS TWO REFERENCE MARKS. RM 1 IS NORTH OF THE STATION AND RM
AH7022'2 IS EAST OF THE STATION. RM 1 AND RM 2 ARE STANDARD PACIFIC COUNTY
AH7022'SURVEY DISKS SET IN CONCRETE WITH WITNESS POSTS IN LINE WITH THE
AH7022'STATION. A 2 INCH PIPE PROJECTING 6 FT (1.8 M) MARKS THE BASE OF THE
AH7022'SEAWARD MOST VEGETATED DUNE ON THE OCEAN SIDE. THE STATION IS A
AH7022'STANDARD PACIFIC COUNTY SURVEY DISK STAMPED STA 021 WITH A STEEL
AH7022'WITNESS POST LOCATED ABOUT 0.8 M (2.6 FT) FROM THE STATION. REFERENCE
AH7022'MARK 1 IS A STANDARD PACIFIC COUNTY SURVEY DISK STAMPED STA 021 RM 1.
AH7022'RM 1 IS 18 M, (59.1 FT) 2 DEGREES GRID, FROM THE STATION. A STEEL
AH7022'WITNESS POST IS 1 M (3.3 FT) NORTH OF RM 1. REFERENCE MARK 2 IS A
AH7022'STANDARD PACIFIC COUNTY SURVEY DISK STAMPED STA 021 RM 2. RM 2 IS 19
AH7022'M, (62.3 FT) 99 DEGREES GRID, FROM THE STATION. A STEEL WITNESS POST
AH7022'IS 1 M (3.3 FT) EAST OF RM 2. A 2 INCH PIPE PROJECTING 6 FT (1.8 M)
AH7022'MARKS THE BASE OF THE SEAWARD MOST VEGETATED DUNE AND IS ABOUT 100 M
AH7022'(328.1 FT) WEST OF THE STATION.
AH7022
AH7022   STATION RECOVERY (1999)
AH7022
AH7022'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7022'RECOVERED AS DESCRIBED.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7025 ***********************************************************************
 AH7025  DESIGNATION -  PC 025
 AH7025  PID         -  AH7025
 AH7025  STATE/COUNTY-  WA/PACIFIC
 AH7025  USGS QUAD   -  CAPE DISAPPOINTMENT (1985)
 AH7025
 AH7025                        *CURRENT SURVEY CONTROL
 AH7025  ______________________________________________________________________
 AH7025* NAD 83(1991)-  46 19 30.04613(N)    124 03 58.91588(W)     ADJUSTED
 AH7025* NAVD 88     -         6.32   (meters)      20.7    (feet)  GPS OBS
 AH7025  ______________________________________________________________________
 AH7025  X           -  -2,471,533.788 (meters)                     COMP
 AH7025  Y           -  -3,655,060.116 (meters)                     COMP
 AH7025  Z           -   4,590,256.318 (meters)                     COMP
 AH7025  LAPLACE CORR-          14.69  (seconds)                    DEFLEC96
 AH7025  ELLIP HEIGHT-         -18.04  (meters)                     GPS OBS
 AH7025  GEOID HEIGHT-         -24.21  (meters)                     GEOID96
 AH7025
 AH7025  HORZ ORDER  -  FIRST
 AH7025  ELLP ORDER  -  THIRD     CLASS II
 AH7025
 AH7025.The horizontal coordinates were established by GPS observations
 AH7025.and adjusted by the National Geodetic Survey in January 1999.
 AH7025
 AH7025.The orthometric height was determined by GPS observations and a
 AH7025.high-resolution geoid model using precise GPS observation and
 AH7025.processing techniques.
 AH7025
 AH7025.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7025
 AH7025.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7025
 AH7025.The ellipsoidal height was determined by GPS observations
 AH7025.and is referenced to NAD 83.
 AH7025
 AH7025.The geoid height was determined by GEOID96.
 AH7025
 AH7025;                    North         East     Units   Scale      Converg.
 AH7025;SPC WA S     -   116,431.952   225,473.758   MT  0.99992485 -2 35 26.1
 AH7025;UTM  10      - 5,130,712.195   417,913.856   MT  0.99968283 -0 46 16.7
 AH7025
 AH7025                          SUPERSEDED SURVEY CONTROL
 AH7025
 AH7025.No superseded survey control is available for this station.
 AH7025
 AH7025_MARKER: DD = SURVEY DISK
 AH7025_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 AH7025_STAMPING: STA 025
 AH7025_PROJECTION: FLUSH
 AH7025_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
 AH7025_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AH7025+STABILITY: SURFACE MOTION
 AH7025
 AH7025  HISTORY     - Date     Condition        Recov. By
 AH7025  HISTORY     - 1976     MONUMENTED       WA-049
 AH7025  HISTORY     - 19990419 GOOD             WADECO
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AH7025
AH7025 STATION DESCRIPTION
AH7025
AH7025'DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (JOT)
AH7025'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) . THE
AH7025'STATION IS LOCATED ON THE WESTERN MOST VEGETATED SAND DUNES IN THE
AH7025'VICINITY OF SEAVIEW. TO REACH FROM THE INTERSECTION OF SR 103/SR 101
AH7025'AND 38TH PLACE IN SEAVIEW GO WEST ON 38TH PLACE 0.55 MILES (0.89 KM)
AH7025'TO THE OCEAN BEACH. PROCEED SOUTH ON BEACH 0.36 MILES. (0.58 KM) PARK
AH7025'VEHICLE AND PROCEED EAST ABOUT 90 M (295.3 FT) TO HIGH VEGETATED DUNE
AH7025'AND STATION. THE STATION IS A STANDARD PADIFIC COUNTY SURVEY DISK SET
AH7025'FLUSH IN A ROUND CONCRETE MONUMENT. THE UNDERGROUND MARK IS A 5/8
AH7025'INCH REBAR SET IN CONCRETE 2.5 FT (0.8 M) BELOW THE SURFACE MARK. RM 1
AH7025'AND RM 2 ARE STANDARD PACIFIC COUNTY SURVEY DISKS SET IN CONCRETE WITH
AH7025'WITNESS POSTS SET IN LINE WITH THE STATION. A 2 INCH PIPE PROJECTING
AH7025'6 FT (1.8 M) MARKS THE BASE OF THE SEAWORD MOST VEGETATED DUNE AND IS
AH7025'ABOUT 90 M (295.3 FT) WEST OF THE STATION. THE STATION IS STAMPED STA
AH7025'025. A ORANGE NGS WITNESS POST AND A STEEL WITNESS POST ARE WITHIN 1
AH7025'M (3.3 FT) OF THE STATION. REFERENCE MARK 1 IS STAMPED STA 025 RM 1.
AH7025'RM 1 IS 21.91 M, (71.88 FT) 96 DEGREES GRID, FROM THE STATION.
AH7025'REFERENCE MARK 2 IS STAMPED STA 025 RM 2. RM 2 IS 19.71 M, (64.67 FT)
AH7025'185 DEGREES GRID FROM THE STATION. THE 2 INCH DIAMETER PIPE IS 90 M
AH7025'(295.3 FT) WEST OF THE STATION.
AH7025
AH7025 STATION RECOVERY (1999)
AH7025
AH7025'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7025'RECOVERED AS DESCRIBED.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7021 ***********************************************************************
 AH7021  DESIGNATION -  PC 032
 AH7021  PID         -  AH7021
 AH7021  STATE/COUNTY-  WA/PACIFIC
 AH7021  USGS QUAD   -  OCEAN PARK (1985)
 AH7021
 AH7021                        *CURRENT SURVEY CONTROL
 AH7021  ______________________________________________________________________
 AH7021* NAD 83(1991)-  46 29 58.66582(N)    124 03 25.77919(W)     ADJUSTED
 AH7021* NAVD 88     -         9.67   (meters)      31.7    (feet)  GPS OBS
 AH7021  ______________________________________________________________________
 AH7021  X           -  -2,463,074.447 (meters)                     COMP
 AH7021  Y           -  -3,643,811.305 (meters)                     COMP
 AH7021  Z           -   4,603,641.421 (meters)                     COMP
 AH7021  LAPLACE CORR-          16.25  (seconds)                    DEFLEC96
 AH7021  ELLIP HEIGHT-         -14.64  (meters)                     GPS OBS
 AH7021  GEOID HEIGHT-         -24.16  (meters)                     GEOID96
 AH7021
 AH7021  HORZ ORDER  -  FIRST
 AH7021  ELLP ORDER  -  THIRD     CLASS II
 AH7021
 AH7021.The horizontal coordinates were established by GPS observations
 AH7021.and adjusted by the National Geodetic Survey in January 1999.
 AH7021
 AH7021.The orthometric height was determined by GPS observations and a
 AH7021.high-resolution geoid model using precise GPS observation and
 AH7021.processing techniques.
 AH7021
 AH7021.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7021
 AH7021.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7021
 AH7021.The ellipsoidal height was determined by GPS observations
 AH7021.and is referenced to NAD 83.
 AH7021
 AH7021.The geoid height was determined by GEOID96.
 AH7021
 AH7021;                    North         East     Units   Scale      Converg.
 AH7021;SPC WA S     -   135,788.931   227,056.809   MT  0.99991571 -2 35 02.1
 AH7021;UTM  10      - 5,150,105.045   418,881.732   MT  0.99968088 -0 46 00.7
 AH7021
 AH7021                           SUPERSEDED SURVEY CONTROL
 AH7021
 AH7021.No superseded survey control is available for this station.
 AH7021
 AH7021_MARKER: DD = SURVEY DISK
 AH7021_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 AH7021_STAMPING: STA 032
 AH7021_PROJECTION: FLUSH
 AH7021_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
 AH7021_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AH7021+STABILITY: SURFACE MOTION
 AH7021_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7021+SATELLITE: SATELLITE OBSERVATIONS - 1976
 AH7021
 AH7021  HISTORY     - Date     Condition        Recov. By
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AH7021  HISTORY     - 1976     MONUMENTED       WA-049
AH7021  HISTORY     - 19990419 GOOD             WADECO
AH7021
AH7021                          STATION DESCRIPTION
AH7021
AH7021'DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (JOT)
AH7021'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) .  THE
AH7021'STATION IS LOCATED ON THE WESTERN MOST VEGETATED SAND DUNES IN THE
AH7021'VINCITY OF OCEAN PARK.  FROM THE INTERSECTION OF SR 103 AND BAY AVENUE
AH7021'IN OCEAN CITY GO WEST ALONG BAY AVENUE TO BEACH ACCESS.  GO NORTH
AH7021'ALONG BEACH FOR 0.55 MILES. (0.89 KM) FROM THE SEAWORD MOST VEGETATED
AH7021'DUNE GO EAST ABOUT 100 M (328.1 FT) TO STATION.  THE STATION IS MARKED
AH7021'WITH A STANDARD PACIFIC COUNTY SURVEY DISK SET FLUSH WITH THE GROUND
AH7021'IN A ROUND CONCRETE MONUMENT.  THE UNDERGROUND MARKS CONSISTS OF A
AH7021'5/8-INCH REBAR SET IN CONCRETE 2.5 FT (0.8 M) BELOW THE SURFACE MARK.
AH7021'REFERENCE MARK 1 AND 2 ARE STANDARD PACIFIC COUNTY SURVEY DISKS SET IN
AH7021'CONCRETE WITH STEEL WITNESS POSTS SET IN LINE WITH THE STATION.  THE
AH7021'STATION IS STAMPED STA 032.  A STEEL WITNESS POST IS LOCATE WITHIN 1 M
AH7021'(3.3 FT) OF THE STATION.  REFERENCE MARK 1 IS STAMPED STA 032 RM 1.
AH7021'RM 1 IS 26.0 M (85.3 FT) (0 DEGREES GRID) FROM THE STATION.  REFERENCE
AH7021'MARK 2 IS STAMPED STA 032 RM 2. RM 2 IS 21.4 M (70.2 FT) (96 DEGREES
AH7021'GRID) FROM THE STATION.  A 2 INCH PIPE PROJECTIN 6 FT (1.8 M) MARKS
AH7021'THE BASE OF THE SEAWORD MOST VEGETATED DUNE AND IS 100 M (328.1 FT)
AH7021'WEST OF THE STATION.
AH7021
AH7021                          STATION RECOVERY (1999)
AH7021
AH7021'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7021'RECOVERED AS DESCRIBED.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7020 ***********************************************************************
 AH7020  DESIGNATION -  PC 035
 AH7020  PID         -  AH7020
 AH7020  STATE/COUNTY-  WA/PACIFIC
 AH7020  USGS QUAD   -  OYSTERVILLE (1985)
 AH7020
 AH7020                         *CURRENT SURVEY CONTROL
 AH7020  ______________________________________________________________________
 AH7020* NAD 83(1991)-  46 30 59.34967(N)    124 03 27.92368(W)     ADJUSTED
 AH7020* NAVD 88     -         9.76   (meters)      32.0    (feet)  GPS OBS
 AH7020  ______________________________________________________________________
 AH7020  X           -  -2,462,351.073 (meters)                     COMP
 AH7020  Y           -  -3,642,659.537 (meters)                     COMP
 AH7020  Z           -   4,604,931.140 (meters)                     COMP
 AH7020  LAPLACE CORR-          16.08  (seconds)                    DEFLEC96
 AH7020  ELLIP HEIGHT-         -14.54  (meters)                     GPS OBS
 AH7020  GEOID HEIGHT-         -24.16  (meters)                     GEOID96
 AH7020
 AH7020  HORZ ORDER  -  FIRST
 AH7020  ELLP ORDER  -  THIRD     CLASS II
 AH7020
 AH7020.The horizontal coordinates were established by GPS observations
 AH7020.and adjusted by the National Geodetic Survey in January 1999.
 AH7020
 AH7020.The orthometric height was determined by GPS observations and a
 AH7020.high-resolution geoid model using precise GPS observation and
 AH7020.processing techniques.
 AH7020
 AH7020.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7020
 AH7020.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7020
 AH7020.The ellipsoidal height was determined by GPS observations
 AH7020.and is referenced to NAD 83.
 AH7020
 AH7020.The geoid height was determined by GEOID96.
 AH7020
 AH7020;                    North         East     Units   Scale      Converg.
 AH7020;SPC WA S     -   137,662.732   227,095.614   MT  0.99991531 -2 35 03.6
 AH7020;UTM  10      - 5,151,978.694   418,861.112   MT  0.99968092 -0 46 03.1
 AH7020
 AH7020|----------------------------------------------------------------------|
 AH7020| PID    Reference Object                    Distance      Geod. Az  |
 AH7020|                                                          dddmmss.s |
 AH7020| SD0323 X 537                             110.871 METERS 13031     |
 AH7020|----------------------------------------------------------------------|
 AH7020
 AH7020                          SUPERSEDED SURVEY CONTROL
 AH7020
 AH7020.No superseded survey control is available for this station.
 AH7020
 AH7020_MARKER: DD = SURVEY DISK
 AH7020_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 AH7020_STAMPING: STA 035
 AH7020_PROJECTION: FLUSH
 AH7020_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
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AH7020_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
AH7020+STABILITY: SURFACE MOTION
AH7020_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AH7020+SATELLITE: SATELLITE OBSERVATIONS - 1976
AH7020
AH7020  HISTORY     - Date     Condition        Recov. By
AH7020  HISTORY     - 1976     MONUMENTED       WA-049
AH7020  HISTORY     - 19830113 GOOD             NGS
AH7020  HISTORY     - 19990419 GOOD             WADECO
AH7020
AH7020                          STATION DESCRIPTION
AH7020
AH7020'DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (JOT)
AH7020'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) .  THE
AH7020'STATION IS LOCATED NORTH OF OCEAN PARK.  FROM THE INTERSECTION OF SR
AH7020'103 AND VERNON AVENUE FOLLOW VERNON AVENUE NORTH TO JOE JOHNS ROAD.
AH7020'TURN WEST AND FOLLOW JOE JOHNS ROAD TO THE INTERSECTION WITH H STREET.
AH7020'TURN NORTH AND FOLLOW H STREET TO INTERSECTION WITH 295TH STREET.  THE
AH7020'STATION IS 113.5 M (372.4 FT) (270 DEGREES GRID) FROM THE INTERSECTION
AH7020'OF H STREET AND 295TH STREET, 57 M (187.0 FT) WEST OF THE CENTERLINE
AH7020'OF G STREET, 73 M (239.5 FT) NORTH OF THE CENTERLINE OF THE BEACH
AH7020'ACCESS ROAD, AND 0.5 M (1.6 FT) EAST OF A METAL WITNESS POST.  THE
AH7020'STATION IS A STANDARD PACIFIC COUNTY SURVEY DISK SET FLUSH WITH THE
AH7020'GROUND IN A ROUND CONRETE MONUMENT.  THE UNDERGROUND MARK CONSISTS OF
AH7020'5/8-INCH REBAR SET ON CONCRETE 2.5 FT (0.8 M) BELOW THE SURFACE MARK.
AH7020'REFERENCE MARK 1 AND 2 ARE STANDARD PACIFIC COUNTY DISKS SET IN
AH7020'CONCRETE.  THE STATION IS STAMPED STA 035.  REFERENCE MARK 1 IS
AH7020'STAMPED STA 035 RM 1.  RM 1 IS 16.5 M (54.1 FT) (76 DEGREES GRID) FROM
AH7020'THE STATION.  REFERENCE MARK 2 IS STAMPED STA 035 RM 2.  RM 2 IS 23.4
AH7020'(177 DEGREES GRID) FROM THE STATION.  THIS STATION WAS CONVENTIONALLY
AH7020'TIED TO STATION X 537 USING SECOND ORDER LEVELING METHODS.  LEVELS
AH7020'HAVE BEEN RUN TO THIS POINT. THE STATION IS 4.001 M (13.127 FT) HIGHER
AH7020'AND 113.5 M (372.4 FT) NORTHWEST OF X 537 (SD0323) .  THE LEVELED
AH7020'NAVD88 ELEVATION OF 035 IS 9.764 M, (32.034 FT) OR 4.001 M (13.127 FT)
AH7020'HIGHER THAN X 537.
AH7020
AH7020                          STATION RECOVERY (1983)
AH7020
AH7020'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1983 (DAW)
AH7020'THE STATION IS LOCATED ABOUT 4 KM (2.50 MI) SOUTHWEST OF OYSTERVILLE,
AH7020'1.7 KM (1.05 MI) NORTH OF OCEAN PARK AND ON THE TOP OF THE MOST
AH7020'WESTERLY SAND DUNE IN THE VICINITY. TO REACH FRON THE INTERSECTION OF
AH7020'STATE ROUTE 103 AND BAY AVENUE IN OCEAN PARK, GO WEST ON BAY AVENUE
AH7020'FOR 0.64 KM (0.40 MI) TO THE BEACH. TURN RIGHT AND GO NORTHERLY ALONG
AH7020'THE BEACH FOR 2.74 KM (1.70 MI) TO THE END OF TRUCK TRAVEL.  WALK EAST
AH7020'FOR ABOUT 90 M (295.3 FT) TO THE TOP OF THE HIGHEST DUNE AND THE
AH7020'STATION. THE MARK IS SET IN THE TOP OF A ROUND CONCRETE MONUMENT THAT
AH7020'IS 0.20 INCHES IN DIAMETER AND PROJECTS 0.10 M (0.33 FT) ABOVE THE
AH7020'GROUND SURFACE.  IT IS 64 M (210.0 FT) NORTH-NORTHEAST OF A 2-INCH
AH7020'IRON PIPE, 17.1 M (56.1 FT) WEST-SOUTHWEST OF A WITNESS POST AND 23.8
AH7020'M (78.1 FT) NORTH OF A WITNESS POST.
AH7020
AH7020                          STATION RECOVERY (1999)
AH7020
AH7020'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7020'RECOVERED AS DESCRIBED.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7019 ***********************************************************************
 AH7019  DESIGNATION -  PC 037
 AH7019  PID         -  AH7019
 AH7019  STATE/COUNTY-  WA/PACIFIC
 AH7019  USGS QUAD   -  OYSTERVILLE (1985)
 AH7019
 AH7019                         *CURRENT SURVEY CONTROL
 AH7019  ______________________________________________________________________
 AH7019* NAD 83(1991)-  46 31 38.48794(N)    124 03 29.53000(W)     ADJUSTED
 AH7019* NAVD 88     -         9.79   (meters)      32.1    (feet)  GPS OBS
 AH7019  ______________________________________________________________________
 AH7019  X           -  -2,461,888.331 (meters)                     COMP
 AH7019  Y           -  -3,641,913.853 (meters)                     COMP
 AH7019  Z           -   4,605,762.710 (meters)                     COMP
 AH7019  LAPLACE CORR-          15.83  (seconds)                    DEFLEC96
 AH7019  ELLIP HEIGHT-         -14.52  (meters)                     GPS OBS
 AH7019  GEOID HEIGHT-         -24.16  (meters)                     GEOID96
 AH7019
 AH7019  HORZ ORDER  -  FIRST
 AH7019  ELLP ORDER  -  THIRD     CLASS II
 AH7019
 AH7019.The horizontal coordinates were established by GPS observations
 AH7019.and adjusted by the National Geodetic Survey in January 1999.
 AH7019
 AH7019.The orthometric height was determined by GPS observations and a
 AH7019.high-resolution geoid model using precise GPS observation and
 AH7019.processing techniques.
 AH7019
 AH7019.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7019
 AH7019.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7019
 AH7019.The ellipsoidal height was determined by GPS observations
 AH7019.and is referenced to NAD 83.
 AH7019
 AH7019.The geoid height was determined by GEOID96.
 AH7019
 AH7019;                    North         East     Units   Scale      Converg.
 AH7019;SPC WA S     -   138,871.463   227,115.905   MT  0.99991510 -2 35 04.8
 AH7019;UTM  10      - 5,153,187.178   418,843.077   MT  0.99968096 -0 46 04.7
 AH7019
 AH7019:                Primary Azimuth Mark                    Grid Az
 AH7019:SPC WA S     -  PC 035                                  180 57 42.2
 AH7019:UTM  10      -  PC 035                                  179 08 42.1
 AH7019
 AH7019|----------------------------------------------------------------------|
 AH7019| PID    Reference Object                    Distance      Geod. Az  |
 AH7019|                                                          dddmmss.s |
 AH7019| AH7020 PC 035                           APPROX. 1.2 KM 1782237.4 |
 AH7019|----------------------------------------------------------------------|
 AH7019
 AH7019                          SUPERSEDED SURVEY CONTROL
 AH7019
 AH7019.No superseded survey control is available for this station.
 AH7019
 AH7019_MARKER: DD = SURVEY DISK
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AH7019_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
AH7019_STAMPING: STA 037
AH7019_PROJECTION: FLUSH
AH7019_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
AH7019_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
AH7019+STABILITY: SURFACE MOTION
AH7019_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AH7019+SATELLITE: SATELLITE OBSERVATIONS - January 13, 1983
AH7019
AH7019  HISTORY     - Date     Condition        Recov. By
AH7019  HISTORY     - 1976     MONUMENTED       WA-049
AH7019  HISTORY     - 19830113 GOOD             NGS
AH7019  HISTORY     - 19990419 GOOD             WADECO
AH7019
AH7019                          STATION DESCRIPTION
AH7019
AH7019'DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (JOT)
AH7019'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) .  THIS
AH7019'STATION IS LOCATED IN THE GRASSED SAND DUNES ALONG THE PACIFIC OCEAN
AH7019'IN THE VINCITY OF THE CITY OF OCEAN PARK.  FROM THE INTERSECTION OF SR
AH7019'103 AND BAY AVENUE GO WEST ALONG BAY AVENUE TO BEACH ACCESS AND BEACH.
AH7019'GO NORTHERLY ALONG THE BEACH FOR 2.46 MILES (3.96 KM) AND STATION ON
AH7019'RIGHT.  THE STATION IS ABOUT 100 M (328.1 FT) EAST OF THE SEAWORD MOST
AH7019'GRASS COVERED SAND DUNE.  THE STATION IS A STANDARD PACIFIC COUNTY
AH7019'SURVEY DISK SET FLUSH WITH THE GROUND IN A ROUND CONCRETE MONUMENT.
AH7019'THE UNDERGROUND MARK CONSISTS OF A 5/8-INCH REBAR SET IN CONCRETE 2.5
AH7019'FT (0.8 M) BELOW THE SURFACE MARK.  REFERENCE MARK 1 AND 2 ARE
AH7019'STANDARD SURVEY DISKS SET IN CONCRETE WITH WITNESS POSTS SET IN LINE
AH7019'WITH THE STATION.  THE STATION IS STAMPED STA 037. A STEEL WITNESS
AH7019'POST IS WITHIN 1 M (3.3 FT) OF THE STATION. REFERENCE MARK 1 IS
AH7019'STAMPED STA 037 RM 1.  RM 1 IS 19.9 M (65.3 FT) (352 DEGREES GRID)
AH7019'FROM THE STATION. REFERENCE MARK 2 IS STAMPED STA 037 RM 2.  RM 2 IS
AH7019'16.7 M (54.8 FT) (83 DEGREES GRID) FROM THE STATION.  A 2 INCH PIPE
AH7019'PROJECTING 6 FT (1.8 M) IS 100 M (328.1 FT) WEST OF THE STATION AND
AH7019'MARKS THE BASE OF THE SEAWORD MOST SAND DUNE ON THE OCEAN SIDE.
AH7019
AH7019                          STATION RECOVERY (1983)
AH7019
AH7019'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1983 (DAW)
AH7019'THE STATION IS LOCATED ABOUT 4 KM (2.50 MI) NORTH OF OCEAN PARK, 3.2
AH7019'KM (2.00 MI) SOUTHWEST OF OYSTERVILLE AND ON THE TOP OF THE MOST
AH7019'WESTERLY SAND DUNE IN THE AREA. TO REACH FROM THE INTERSECTION OF
AH7019'STATE ROUTE 103 AND BAY AVENUE IN OCEAN PARK, GO WEST ON BAY AVENUE
AH7019'FOR 0.64 KM (0.40 MI) TO THE BEACH. TURN RIGHT AND GO NORTH ON THE
AH7019'BEACH FOR 4.02 KM (2.50 MI) TO THE END OF TRUCK TRAVEL.  WALK EAST
AH7019'THROUGH THE SAND FOR ABOUT 90 M (295.3 FT) TO THE TOP OF THE FIRST
AH7019'DUNE AND THE STATION. THE MARK IS SET IN THE TOP OF A ROUND CONCRETE
AH7019'MONUMENT THAT IS 0.26 M (0.85 FT) IN DIAMETER AND IS FLUSH WITH THE
AH7019'SURFACE OF THE SAND DUNE. IT IS 29.6 M (97.1 FT) EAST OF A 2-INCH PIPE
AH7019'THAT PROJECTS 1.8 M (5.9 FT) ABOVE THE GROUND SURFACE, 17.4 M (57.1
AH7019'FT) WEST OF A WITNESS POST AND 20.4 M (66.9 FT) SOUTH OF A WITNESS
AH7019'P0ST.
AH7019
AH7019                          STATION RECOVERY (1999)
AH7019
AH7019'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7019'RECOVERED AS DESCRIBED.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7016 ***********************************************************************
 AH7016  DESIGNATION -  PC 044
 AH7016  PID         -  AH7016
 AH7016  STATE/COUNTY-  WA/PACIFIC
 AH7016  USGS QUAD   -  OYSTERVILLE (1985)
 AH7016
 AH7016                         *CURRENT SURVEY CONTROL
 AH7016  ______________________________________________________________________
 AH7016* NAD 83(1991)-  46 34 43.28341(N)    124 03 46.28945(W)     ADJUSTED
 AH7016* NAVD 88     -         7.26   (meters)      23.8    (feet)  GPS OBS
 AH7016  ______________________________________________________________________
 AH7016  X           -  -2,459,862.897 (meters)                     COMP
 AH7016  Y           -  -3,638,280.412 (meters)                     COMP
 AH7016  Z           -   4,609,684.896 (meters)                     COMP
 AH7016  LAPLACE CORR-          15.52  (seconds)                    DEFLEC96
 AH7016  ELLIP HEIGHT-         -17.06  (meters)                     GPS OBS
 AH7016  GEOID HEIGHT-         -24.18  (meters)                     GEOID96
 AH7016
 AH7016  HORZ ORDER  -  FIRST
 AH7016  ELLP ORDER  -  THIRD     CLASS II
 AH7016
 AH7016.The horizontal coordinates were established by GPS observations
 AH7016.and adjusted by the National Geodetic Survey in January 1999.
 AH7016
 AH7016.The orthometric height was determined by GPS observations and a
 AH7016.high-resolution geoid model using precise GPS observation and
 AH7016.processing techniques.
 AH7016
 AH7016.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7016
 AH7016.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7016
 AH7016.The ellipsoidal height was determined by GPS observations
 AH7016.and is referenced to NAD 83.
 AH7016
 AH7016.The geoid height was determined by GEOID96.
 AH7016
 AH7016;                    North         East     Units   Scale      Converg.
 AH7016;SPC WA S     -   144,587.456   227,016.756   MT  0.99991460 -2 35 17.0
 AH7016;UTM  10      - 5,158,895.823   418,562.868   MT  0.99968152 -0 46 19.3
 AH7016
 AH7016                           SUPERSEDED SURVEY CONTROL
 AH7016
 AH7016.No superseded survey control is available for this station.
 AH7016
 AH7016_MARKER: DD = SURVEY DISK
 AH7016_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 AH7016_STAMPING: STA 044
 AH7016_PROJECTION: FLUSH
 AH7016_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
 AH7016_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AH7016+STABILITY: SURFACE MOTION
 AH7016_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7016+SATELLITE: SATELLITE OBSERVATIONS - 1976
 AH7016
 AH7016  HISTORY     - Date     Condition        Recov. By
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AH7016  HISTORY     - 1976     MONUMENTED       WA-049
AH7016  HISTORY     - 19990419 GOOD             WADECO
AH7016
AH7016                          STATION DESCRIPTION
AH7016
AH7016'DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (JOT)
AH7016'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) .  THE
AH7016'STATION IS LOCATED NORTH OF OCEAN PARK AND WEST OF OYSTERVILLE.  FROM
AH7016'OYSTERVILLE GO WEST ON OYSTERVILLE ROAD TO BEACH ACCESS.  GO NORTH
AH7016'2.10 MILES (3.38 KM) ON BEACH TO STATION ON RIGHT.  THE STATION IS 280
AH7016'M (918.6 FT) NORTH OF A PRIVATE BEACH ACCESS ROAD WITH TWO RAILROAD
AH7016'TIES PROJECTING 4 FT (1.2 M) ABOVE THE GROUND, ABOUT 100 M (328.1 FT)
AH7016'EAST OF THE SEAWORD MOST VEGETATED DUNE, AND 1 M (3.3 FT) EAST OF A
AH7016'METAL WITNESS POST.  THE STATION IS MARKED WITH A STANDARD PACIFIC
AH7016'COUNTY SURVEY DISK SET FLUSH WITH THE GROUND IN A ROUND CONCRETE
AH7016'MONUMENT.  THE UNDERGROUND MARK CONSISTS OF A 5/8 INCH REBAR WITH
AH7016'PLASTIC CAP SET IN CONCRETE 2.5 FT (0.8 M) BELOW THE SURFACE MARK.  RM
AH7016'1 AND RM 2 ARE STANDARD PACIFIC COUNTY DISKS SET IN CONCRETE WITH
AH7016'WITNESS POSTS IN LINE WITH THE STATION.  A 6 INCH PIPE PROJECTING 6 FT
AH7016'(1.8 M) IS ABOUT 100 M (328.1 FT) WEST OF THE STATION AND MARKS THE
AH7016'OCEAN SIDE OF THE WEST MOST VEGETATED DUNE.  THE STATION IS STAMPED
AH7016'STA 044.  REFERENCE MARK 1 IS STAMPED STA 044 RM 1 AND IS 24 M (78.7
AH7016'FT) (110 DEGREES GRID) FROM THE STATION.  REFERENCE MARK 2 IS STAMPED
AH7016'STA 044 RM 2 AND IS 22 M (72.2 FT) (7 DEGREES GRID) FROM THE STATION.
AH7016
AH7016                          STATION RECOVERY (1999)
AH7016
AH7016'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7016'RECOVERED AS DESCRIBED.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0533 ***********************************************************************
 SD0533  DESIGNATION -  051
 SD0533  PID         -  SD0533
 SD0533  STATE/COUNTY-  WA/PACIFIC
 SD0533  USGS QUAD   -  OYSTERVILLE (1985)
 SD0533
 SD0533                         *CURRENT SURVEY CONTROL
 SD0533  ______________________________________________________________________
 SD0533* NAD 83(1991)-  46 36 53.76045(N)    124 04 01.06667(W)     ADJUSTED
 SD0533* NAVD 88     -         8.69   (meters)      28.5    (feet)  GPS OBS
 SD0533  ______________________________________________________________________
 SD0533  X           -  -2,458,484.404 (meters)                     COMP
 SD0533  Y           -  -3,635,680.164 (meters)                     COMP
 SD0533  Z           -   4,612,454.326 (meters)                     COMP
 SD0533  LAPLACE CORR-          15.25  (seconds)                    DEFLEC96
 SD0533  ELLIP HEIGHT-         -15.64  (meters)                     GPS OBS
 SD0533  GEOID HEIGHT-         -24.19  (meters)                     GEOID96
 SD0533
 SD0533  HORZ ORDER  -  FIRST
 SD0533  ELLP ORDER  -  THIRD     CLASS II
 SD0533
 SD0533.The horizontal coordinates were established by GPS observations
 SD0533.and adjusted by the National Geodetic Survey in January 1999.
 SD0533
 SD0533.The orthometric height was determined by GPS observations and a
 SD0533.high-resolution geoid model using precise GPS observation and
 SD0533.processing techniques.
 SD0533
 SD0533.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0533
 SD0533.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0533
 SD0533.The ellipsoidal height was determined by GPS observations
 SD0533.and is referenced to NAD 83.
 SD0533
 SD0533.The geoid height was determined by GEOID96.
 SD0533
 SD0533;                    North         East     Units   Scale      Converg.
 SD0533;SPC WA S     -   148,626.156   226,884.585   MT  0.99991473 -2 35 27.7
 SD0533;UTM  10      - 5,162,927.368   418,302.852   MT  0.99968204 -0 46 31.7
 SD0533
 SD0533:                Primary Azimuth Mark                    Grid Az
 SD0533:SPC WA S     -  LEAD 5                                  026 21 16.7
 SD0533:UTM  10      -  LEAD 5                                  024 32 20.7
 SD0533
 SD0533|---------------------------------------------------------------------|
 SD0533| PID    Reference Object                    Distance      Geod. Az   |
 SD0533|                                                          dddmmss.s  |
 SD0533| SD0508 LEAD 5                             APPROX. 2.5 KM 0234549.0  |
 SD0533| AH6927 051 RM 2                            11.695 METERS 09546      |
 SD0533| AH6926 051 RM 1                            14.173 METERS 34945      |
 SD0533|---------------------------------------------------------------------|
 SD0533
 SD0533                          SUPERSEDED SURVEY CONTROL
 SD0533
 SD0533  NAD 83(1991)-  46 36 53.75132(N)    124 04 01.06530(W) AD(       ) 2
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SD0533  NAD 83(1991)-  46 36 53.74993(N)    124 04 01.06426(W) AD(       ) 2
SD0533  NAD 83(1986)-  46 36 53.74897(N)    124 04 01.04902(W) AD(       ) 2
SD0533  NAD 27      -  46 36 54.39838(N)    124 03 56.44795(W) AD(       ) 2
SD0533  NGVD 29     -         7.9    (m)           26.     (f) VERT ANG
SD0533
SD0533.Superseded values are not recommended for survey control.
SD0533.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0533.See file dsdata.txt to determine how the superseded data were derived.
SD0533
SD0533_MARKER: DD = SURVEY DISK
SD0533_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
SD0533_STAMPING: STA 051
.SD0533_ALIAS: PC 051
SD0533_PROJECTION: FLUSH
SD0533_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
SD0533_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0533+STABILITY: SURFACE MOTION
SD0533_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SD0533+SATELLITE: SATELLITE OBSERVATIONS - February 03, 1982
SD0533
SD0533  HISTORY     - Date     Condition        Recov. By
SD0533  HISTORY     - 1976     MONUMENTED       WA-049
SD0533  HISTORY     - 19820203 GOOD             NGS
SD0533  HISTORY     - 19971015 GOOD             WADECO
SD0533  HISTORY     - 19990419 GOOD             WADECO
SD0533
SD0533                          STATION DESCRIPTION
SD0533
SD0533'DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (CLN)
SD0533'THIS STATION IS A PACIFIC COUNTY CONTROL STATION, WHICH IS LOCATED
SD0533'IN THE AREA OF LEADBETTER POINT ON THE OCEAN SIDE ABOUT 5-1/2 MILES
SD0533'N.W. OF THE U.S. POST OFFICE AT OYSTERVILLE.
SD0533'
SD0533'TO REACH THE STATION FROM THE OYSTERVILLE BEACH APPROACH ROAD GO
SD0533'NORTH ALONG THE BEACH 4.88 MILES (4 WHEEL DRIVE NEEDED) THEN TURN
SD0533'EAST AND GO .07 MILE TO THE FIRST GRASS COVERED SAND DUNE.  THE
SD0533'STATION IS LOCATED ON THE HIGHEST POINT OF THE DUNE.
SD0533'
SD0533'THE STATION IS A PACIFIC COUNTY BRASS DISK STAMPED STATION 051 SET
SD0533'IN A 8-INCH DIAMETER CONCRETE CYLINDER FLUSH TO THE SURFACE.  A
SD0533'2-INCH IRON PIPE PROJECTING 6 FOOT IS LOCATED 70.03 FEET N.W. OF THE
SD0533'STATION AND MARKS THE GRASSLINE.
SD0533'
SD0533'THE SUBSURFACE MARK IS A 5/8-INCH STEEL ROAD WITH A PLASTIC CONE
SD0533'SHAPED CAP STAMPED PACIFIC COUNTY D.P.W. AND A DRILLED CENTER HOLE
SD0533'SET IN AN IRREGULAR MASS OF CONCRETE.
SD0533'
SD0533'REFERENCE MARK NO. 1 IS A PACIFIC COUNTY BRASS DISK STAMPED STATION
SD0533'051 R.M. 1 SET IN A 8-INCH DIAMETER CONCRETE CYLINDER.
SD0533'
SD0533'REFERENCE MARK NO. 2 IS A PACIFIC COUNTY BRASS DISK STAMPED STATION
SD0533'051 R.M. 2 SET IN A 8-INCH DIAMETER CONCRETE CYLINDER.
SD0533'
SD0533'NEAREST TOWN--OYSTERVILLE.
SD0533'
SD0533'HEIGHT OF LIGHT ABOVE STATION MARK 1.5 METERS.
SD0533
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SD0533                          STATION RECOVERY (1982)
SD0533
SD0533'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1982 (DAW)
SD0533'THE STATION IS LOCATED ABOUT 8.8 KM (5.45 MI) NORTHWEST OF OYSTERVILLE
SD0533'ON THE OCEAN SIDE OF LEADBETTER POINT. TO REACH FROM THE OYSTERVILLE
SD0533'BEACH APROACH ROAD. GO NORTH ALONG THE BEACH FOR 7.89 KM (4.90 MI) .
SD0533'TURN RIGHT AND GO EAST FOR 0.16 KM (0.10 MI) TO THE FIRST GRASS
SD0533'COVERED DUNE AND THE STATION. THE MARK IS SET IN THE TOP OF A ROUND
SD0533'CONCRETE MONUMENT THAT IS 0.20 M (0.66 FT)  IN DIAMETER AND IS FLUSH
SD0533'WITH THE GROUND SURFACE.  IT IS 21.3 M (69.9 FT) SOUTHEAST OF A 2-INCH
SD0533'PIPE THAT MARKS THE GRASS LINE.
SD0533
SD0533                          STATION RECOVERY (1997)
SD0533
SD0533'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0533'RECOVERED AS DESCRIBED.
SD0533
SD0533                          STATION RECOVERY (1999)
SD0533
SD0533'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
SD0533'RECOVERED AS DESCRIBED.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7015 ***********************************************************************
 AH7015  DESIGNATION -  PC 055 RM 2
 AH7015  PID         -  AH7015
 AH7015  STATE/COUNTY-  WA/PACIFIC
 AH7015  USGS QUAD   -  NORTH COVE (1985)
 AH7015
 AH7015                         *CURRENT SURVEY CONTROL
 AH7015  ______________________________________________________________________
 AH7015* NAD 83(1991)-  46 38 06.59917(N)    124 03 56.79439(W)     ADJUSTED
 AH7015* NAVD 88     -         4.58   (meters)      15.0    (feet)  GPS OBS
 AH7015  ______________________________________________________________________
 AH7015  X           -  -2,457,491.762 (meters)                     COMP
 AH7015  Y           -  -3,634,374.439 (meters)                     COMP
 AH7015  Z           -   4,613,995.999 (meters)                     COMP
 AH7015  LAPLACE CORR-          15.18  (seconds)                    DEFLEC96
 AH7015  ELLIP HEIGHT-         -19.75  (meters)                     GPS OBS
 AH7015  GEOID HEIGHT-         -24.18  (meters)                     GEOID96
 AH7015
 AH7015  HORZ ORDER  -  FIRST
 AH7015  ELLP ORDER  -  THIRD     CLASS II
 AH7015
 AH7015.The horizontal coordinates were established by GPS observations
 AH7015.and adjusted by the National Geodetic Survey in January 1999.
 AH7015
 AH7015.The orthometric height was determined by GPS observations and a
 AH7015.high-resolution geoid model using precise GPS observation and
 AH7015.processing techniques.
 AH7015
 AH7015.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7015
 AH7015.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7015
 AH7015.The ellipsoidal height was determined by GPS observations
 AH7015.and is referenced to NAD 83.
 AH7015
 AH7015.The geoid height was determined by GEOID96.
 AH7015
 AH7015;                    North         East     Units   Scale      Converg.
 AH7015;SPC WA S     -   150,868.728   227,077.024   MT  0.99991498 -2 35 24.6
 AH7015;UTM  10      - 5,165,174.387   418,424.122   MT  0.99968179 -0 46 29.5
 AH7015
 AH7015                           SUPERSEDED SURVEY CONTROL
 AH7015
 AH7015.No superseded survey control is available for this station.
 AH7015
 AH7015_MARKER: DD = SURVEY DISK
 AH7015_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 AH7015_STAMPING: STA 055 RM 2
 AH7015_PROJECTION: FLUSH
 AH7015_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
 AH7015_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AH7015+STABILITY: SURFACE MOTION
 AH7015_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7015+SATELLITE: SATELLITE OBSERVATIONS - 1976
 AH7015
 AH7015  HISTORY     - Date     Condition        Recov. By
```

AH7015 HISTORY   - 1976   MONUMENTED   WA-049
AH7015 HISTORY   - 19990419 GOOD   WADECO
AH7015
AH7015   STATION DESCRIPTION
AH7015
AH7015'DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (JOT)
AH7015'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) . THE
AH7015'STATION IS A PACIFIC COUNTY CONTROL STATION WHICH IS LOCATED ON THE
AH7015'OCEAN SIDE OF LEADBETTER POINT AND ABOUT 7 MILES (11.3 KM) NORTHWEST
AH7015'OF THE POST OFFICE IN OYSTERVILLE. TO REACH THE STATION FROM
AH7015'OYSTERVILLE, PROCEED WEST ON OYSTERVILLE ROAD TO BEACH ACCESS. PROCEED
AH7015'NORTH ON THE BEACH FOR 6.43 MILES (10.35 KM) INTO THE WILLAPA BAY
AH7015'NATIONAL WILDLIFE REFUGE. THE STATION IS 100 M (328.1 FT) EAST OF THE
AH7015'SEAWORD MOST VEGETATED DUNE. THE STATION IS MARKED WITH A STANDARD
AH7015'PACIFIC COUNTY SURVEY DISK STAMPED STA 055 RM 2 SET FLUSH WITH THE
AH7015'GROUND IN CONCRETE. A STEEL WITNESS POST IS ABOUT 1 M (3.3 FT) SOUTH
AH7015'OF THE STATION. STATION STA 055 IS LOCATED ABOUT 20 M (65.6 FT) (290
AH7015'DEGREES GRID) OF RM 2. STA 055 IS A STANDARD SURVEY DISK THAT WAS SET
AH7015'FLUSH WITH THE GROUND IN CONCRETE. THE UNDERGROUND MARK CONSISTS OF
AH7015'5/8 INCH REBAR AND PLASTIC CAP SET IN CONCRETE 2.5 FT (0.8 M) BELOW
AH7015'THE SUFACE MARK. STATION STA 055 RM 1 IS ABOUT 20 M (65.6 FT) (11
AH7015'DEGREES GRID) FROM THIS STATION. BOTH STA 055 AND STA 055 RM 1 WERE
AH7015'NOT RECOVERED DURING THIS SURVEY AND LOOK TO BE BARRIED 2 TO 3 FT (0.9
AH7015'M) UNDER VEGETATED DUNES. A 2 INCH PIPE, PROJECTING 6 FT, (1.8 M) IS
AH7015'ABOUT 80 M (262.5 FT) WEST OF THE STATION AND MARKS THE OCEAN SIDE OF
AH7015'THE DUNE WHERE THE STATIONS IS LOCATED.
AH7015
AH7015   STATION RECOVERY (1999)
AH7015
AH7015'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7015'RECOVERED AS DESCRIBED.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7017 ***********************************************************************
 AH7017  DESIGNATION -  PC 057
 AH7017  PID         -  AH7017
 AH7017  STATE/COUNTY-  WA/PACIFIC
 AH7017  USGS QUAD   -  OYSTERVILLE (1985)
 AH7017
 AH7017                         *CURRENT SURVEY CONTROL
 AH7017  ______________________________________________________________________
 AH7017* NAD 83(1991)-  46 33 40.31809(N)    124 03 39.85591(W)     ADJUSTED
 AH7017* NAVD 88     -         7.76   (meters)      25.5    (feet)  GPS OBS
 AH7017  ______________________________________________________________________
 AH7017  X           -  -2,460,540.412 (meters)                     COMP
 AH7017  Y           -  -3,639,527.145 (meters)                     COMP
 AH7017  Z           -   4,608,348.642 (meters)                     COMP
 AH7017  LAPLACE CORR-          15.63  (seconds)                    DEFLEC96
 AH7017  ELLIP HEIGHT-         -16.56  (meters)                     GPS OBS
 AH7017  GEOID HEIGHT-         -24.17  (meters)                     GEOID96
 AH7017
 AH7017  HORZ ORDER  -  FIRST
 AH7017  ELLP ORDER  -  THIRD     CLASS II
 AH7017
 AH7017.The horizontal coordinates were established by GPS observations
 AH7017.and adjusted by the National Geodetic Survey in January 1999.
 AH7017
 AH7017.The orthometric height was determined by GPS observations and a
 AH7017.high-resolution geoid model using precise GPS observation and
 AH7017.processing techniques.
 AH7017
 AH7017.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7017
 AH7017.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7017
 AH7017.The ellipsoidal height was determined by GPS observations
 AH7017.and is referenced to NAD 83.
 AH7017
 AH7017.The geoid height was determined by GEOID96.
 AH7017
 AH7017;                    North         East     Units   Scale      Converg.
 AH7017;SPC WA S     -   142,639.147   227,065.847   MT  0.99991468 -2 35 12.3
 AH7017;UTM  10      - 5,156,950.502   418,673.656   MT  0.99968130 -0 46 13.8
 AH7017
 AH7017                           SUPERSEDED SURVEY CONTROL
 AH7017
 AH7017.No superseded survey control is available for this station.
 AH7017
 AH7017_MARKER: DD = SURVEY DISK
 AH7017_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 AH7017_STAMPING: STA 057
 AH7017_PROJECTION: FLUSH
 AH7017_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
 AH7017_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AH7017+STABILITY: SURFACE MOTION
 AH7017_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7017+SATELLITE: SATELLITE OBSERVATIONS - 1976
 AH7017
 AH7017  HISTORY     - Date     Condition        Recov. By
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AH7017 HISTORY   - 1976   MONUMENTED   WA-049
AH7017 HISTORY   - 19990419 GOOD   WADECO
AH7017
AH7017   STATION DESCRIPTION
AH7017
AH7017'DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (JOT)
AH7017'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY (RCD) . THE
AH7017'STATION IS LOCATED NORTH OF OCEAN PARK AND WEST OF OYSTERVILLE. FROM
AH7017'OYSTERVILLER GO WEST ON OYSTERVILLE ROAD PAST G STREET TO BEACH
AH7017'ACCESS. GO NORTH FOR 0.89 MILES (1.43 KM) ON BEACH TO STATION ON
AH7017'RIGHT (4WD REQUIRED) . IF IN A 2WD VEHICLE TURN NORTH ON G STREET AND
AH7017'PROCEED NORTH TO THE INTERSECTION OF 357TH STREET AND G STREET. THE
AH7017'STATION IS 166 M (544.6 FT) NORTHWEST OF THE INTERSECTION OF 357TH
AH7017'STREET AND G STREET, ABOUT 80 M (262.5 FT) EAST OF THE SEAWORD MOST
AH7017'VEGETATED DUNE, 145 M (475.7 FT) NORTH OF THE NORTH MOST WALL OF A
AH7017'MULTIUNIT TOWN HOUSE (SURFCREST CONDOS) , AND 1 M (3.3 FT) SOUTH OF A
AH7017'STEEL WITNESS POST. THE STATION IS MARKED WITH A STANDARD PACIFIC
AH7017'COUNTY SURVEY DISK SET FLUSH WITH THE GROUND IN A ROUND CONCRETE
AH7017'MONUMENT. THE UNDERGROUND MARK CONSISTS OF A 5/8 INCH REBAR SET IN
AH7017'CONCRETE 2.5 FT (0.8 M) BELOW THE SURFACE MARK. RM 1 AND RM 2 ARE
AH7017'STANDARD PACIFIC COUNTY SURVEY DISKS SET IN CONCRETE WITH WITNESS
AH7017'POSTS IN LINE WITH THE STATION. THE STATION IS STAMPED STA 057.
AH7017'REFERENCE MARK 1 IS STAMPED STA 057 RM 1 AND IS 19.9 M (65.3 FT) (17
AH7017'DEGREES GRID) FROM THE STATION. REFERENCE MARK 2 IS STAMPED STA 057
AH7017'RM 2 AND IS 22.3 M (73.2 FT) (96 DEGREES GRID) FROM THE STATION.
AH7017
AH7017   STATION RECOVERY (1999)
AH7017
AH7017'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7017'RECOVERED AS DESCRIBED.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0453 ***********************************************************************
 SD0453  DESIGNATION -  PC 064
 SD0453  PID         -  SD0453
 SD0453  STATE/COUNTY-  WA/PACIFIC
 SD0453  USGS QUAD   -  GRAYLAND (1985)
 SD0453
 SD0453                         *CURRENT SURVEY CONTROL
 SD0453  ______________________________________________________________________
 SD0453* NAD 83(1991)-  46 46 05.52311(N)    124 05 42.59217(W)     ADJUSTED
 SD0453* NAVD 88     -         8.13   (meters)      26.7    (feet)  GPS OBS
 SD0453  ______________________________________________________________________
 SD0453  X           -  -2,453,323.433 (meters)                     COMP
 SD0453  Y           -  -3,624,202.381 (meters)                     COMP
 SD0453  Z           -   4,624,140.570 (meters)                     COMP
 SD0453  LAPLACE CORR-          14.77  (seconds)                    DEFLEC96
 SD0453  ELLIP HEIGHT-         -16.30  (meters)                     GPS OBS
 SD0453  GEOID HEIGHT-         -24.29  (meters)                     GEOID96
 SD0453
 SD0453  HORZ ORDER  -  FIRST
 SD0453  ELLP ORDER  -  THIRD     CLASS II
 SD0453
 SD0453.The horizontal coordinates were established by GPS observations
 SD0453.and adjusted by the National Geodetic Survey in January 1999.
 SD0453
 SD0453.The orthometric height was determined by GPS observations and a
 SD0453.high-resolution geoid model using precise GPS observation and
 SD0453.processing techniques.
 SD0453
 SD0453.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0453
 SD0453.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0453
 SD0453.The ellipsoidal height was determined by GPS observations
 SD0453.and is referenced to NAD 83.
 SD0453
 SD0453.The geoid height was determined by GEOID96.
 SD0453
 SD0453;                    North         East     Units   Scale      Converg.
 SD0453;SPC WA S     -   165,743.021   225,502.985   MT  0.99991969 -2 36 41.4
 SD0453;UTM  10      - 5,179,987.932   416,380.391   MT  0.99968594 -0 47 52.7
 SD0453
 SD0453:                Primary Azimuth Mark                    Grid Az
 SD0453:SPC WA S     -  065                                     358 38 15.8
 SD0453:UTM  10      -  065                                     356 49 27.1
 SD0453
 SD0453|---------------------------------------------------------------------|
 SD0453| PID    Reference Object                    Distance      Geod. Az   |
 SD0453|                                                          dddmmss.s  |
 SD0453|        064 RM 2                             19.029 METERS 08518     |
 SD0453|        064 RM 1                             18.779 METERS 35218     |
 SD0453| SD0454 065                                 APPROX. 0.8 KM 3560134.4 |
 SD0453|---------------------------------------------------------------------|
 SD0453
 SD0453                          SUPERSEDED SURVEY CONTROL
 SD0453
 SD0453  NAD 83(1991)-  46 46 05.51501(N)    124 05 42.59252(W) AD(       ) 2
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SD0453  NAD 83(1991)-  46 46 05.50959(N)    124 05 42.58745(W) AD(       ) 2
SD0453  NAD 83(1986)-  46 46 05.50887(N)    124 05 42.57956(W) AD(       ) 2
SD0453  NAD 27      -  46 46 06.16711(N)    124 05 37.95239(W) AD(       ) 2
SD0453  NGVD 29     -         7.1    (m)           23.     (f) VERT ANG
SD0453
SD0453.Superseded values are not recommended for survey control.
SD0453.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0453.See file dsdata.txt to determine how the superseded data were derived.
SD0453
SD0453_MARKER: DD = SURVEY DISK
SD0453_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
SD0453_STAMPING: STA 064
SD0453_PROJECTION: FLUSH
SD0453_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
SD0453_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0453+STABILITY: SURFACE MOTION
SD0453
SD0453  HISTORY     - Date     Condition        Recov. By
SD0453  HISTORY     - 1976     MONUMENTED       WA-049
SD0453  HISTORY     - 19971015 GOOD             WADECO
SD0453  HISTORY     - 19990419 GOOD             WADECO
SD0453
SD0453                          STATION DESCRIPTION
SD0453
SD0453'DESCRIBED BY PACIFIC COUNTY WASHINGTON 1976 (CLN)
SD0453'THIS STATION IS A PACIFIC COUNTY CONTROL STATION, LOCATED 7 MILES N.
SD0453'OF TOKELAND, 2-1/2 MILES S. OF GRAYLAND ON THE OCEAN BEACH.
SD0453'
SD0453'TO REACH THE STATION FROM THE INTERSECTION OF THE TOKELAND AND SR
SD0453'105 GO NORTH ALONG SR 105 5.26 MILES TO THE MIDWAY BEACH APPROACH
SD0453'TURN LEFT ONTO APPROACH ROAD AND GO .62 MILE TO THE OCEAN BEACH,
SD0453'THEN GO .05 MILE SOUTH ALONG THE WESTERLY SAND DUNE TO THE
SD0453'STATION.
SD0453'
SD0453'THE STATION IS A PACIFIC COUNTY BRASS DISK STAMPED STA. 064 SET IN A
SD0453'8-INCH DIAMETER CONCRETE CYLINDER FLUSH TO THE SURFACE.
SD0453'
SD0453'THE SUBSURFACE MARK IS A 5/8-INCH STEEL ROD WITH A CONE SHAPED
SD0453'PLASTIC CAP STAMPED PACIFIC COUNTY D.P.W. WITH A CENTER DRILL HOLE
SD0453'SET IN AN IRREGULAR MASS OF CONCRETE 3.5 FEET BELOW THE SURFACE.
SD0453'
SD0453'REFERENCE MARK NO. 1 IS A PACIFIC COUNTY BRASS DISK STAMPED STA 064
SD0453'RM 1 SET IN A 8-INCH DIAMETER CONCRETE CYLINDER PROJECTING 4-INCHES
SD0453'ABOVE GROUND.
SD0453'
SD0453'REFERENCE MARK NO. 2 IS A PACIFIC COUNTY BRASS DISK STAMPED STA 064
SD0453'RM 2 SET IN A 8-INCH DIAMETER CONCRETE CYLINDER PROJECTING 6-INCHES
SD0453'ABOVE GROUND.
SD0453'
SD0453'NEAREST TOWN--GRAYLAND.
SD0453
SD0453                          STATION RECOVERY (1997)
SD0453
SD0453'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0453'RECOVERED AS DESCRIBED.  FROM THE COE HYDROGRAPHIC SIGNAL LOCATED JUST
SD0453'NORTH OF MIDWAY BEACH ROAD PROCEED WEST 0.18 MILES (0.29 KM) TO
SD0453'STATION ON LEFT.  THE STATION IS AND ABOUT 90 M (295.3 FT) SOUTH OF
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SD0453'THE CENTERLINE OF MIDWAY BEACH ROAD.
SD0453
SD0453                          STATION RECOVERY (1999)
SD0453
SD0453'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
SD0453'RECOVERED AS DESCRIBED.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7010 ***********************************************************************
 AH7010  DESIGNATION -  PC 068
 AH7010  PID         -  AH7010
 AH7010  STATE/COUNTY-  WA/PACIFIC
 AH7010  USGS QUAD   -  GRAYLAND (1985)
 AH7010
 AH7010                        *CURRENT SURVEY CONTROL
 AH7010  ______________________________________________________________________
 AH7010* NAD 83(1991)-  46 47 38.41504(N)    124 05 50.69679(W)     ADJUSTED
 AH7010* NAVD 88     -         7.80   (meters)      25.6    (feet)  GPS OBS
 AH7010  ______________________________________________________________________
 AH7010  X           -  -2,452,293.839 (meters)                     COMP
 AH7010  Y           -  -3,622,374.783 (meters)                     COMP
 AH7010  Z           -   4,626,104.605 (meters)                     COMP
 AH7010  LAPLACE CORR-          14.79  (seconds)                    DEFLEC96
 AH7010  ELLIP HEIGHT-         -16.65  (meters)                     GPS OBS
 AH7010  GEOID HEIGHT-         -24.30  (meters)                     GEOID96
 AH7010
 AH7010  HORZ ORDER  -  FIRST
 AH7010  ELLP ORDER  -  THIRD     CLASS II
 AH7010
 AH7010.The horizontal coordinates were established by GPS observations
 AH7010.and adjusted by the National Geodetic Survey in January 1999.
 AH7010
 AH7010.The orthometric height was determined by GPS observations and a
 AH7010.high-resolution geoid model using precise GPS observation and
 AH7010.processing techniques.
 AH7010
 AH7010.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7010
 AH7010.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7010
 AH7010.The ellipsoidal height was determined by GPS observations
 AH7010.and is referenced to NAD 83.
 AH7010
 AH7010.The geoid height was determined by GEOID96.
 AH7010
 AH7010;                    North         East     Units   Scale      Converg.
 AH7010;SPC WA S     -   168,616.114   225,461.984   MT  0.99992123 -2 36 47.3
 AH7010;UTM  10      - 5,182,857.615   416,248.526   MT  0.99968621 -0 47 59.8
 AH7010
 AH7010                           SUPERSEDED SURVEY CONTROL
 AH7010
 AH7010.No superseded survey control is available for this station.
 AH7010
 AH7010_MARKER: DD = SURVEY DISK
 AH7010_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 AH7010_STAMPING: STA 068
 AH7010_PROJECTION: FLUSH
 AH7010_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
 AH7010_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AH7010+STABILITY: SURFACE MOTION
 AH7010_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7010+SATELLITE: SATELLITE OBSERVATIONS - 1977
 AH7010
 AH7010  HISTORY     - Date     Condition        Recov. By
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AH7010  HISTORY     - 1977     MONUMENTED       WA-049
AH7010  HISTORY     - 19990419 GOOD             WADECO
AH7010
AH7010                          STATION DESCRIPTION
AH7010
AH7010'DESCRIBED BY PACIFIC COUNTY WASHINGTON 1977 (JOT)
AH7010'DESCRIBED BY THE WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD) THE
AH7010'STATION IS LOCATED IN THE VINCITY OF GRAYLAND, WASHINGTON.  FROM
AH7010'GRAYLAND PROCEED SOUTH ABOUT 1 MILE (1.6 KM) ON SR 105 TO
AH7010'SMITH-ANDERSON ROAD AND THE PACIFIC COUNTY LINE.  TURN WEST ON
AH7010'SMITH-ANDERSON ROAD AND GO 0.37 MILES (0.60 KM) (TOWARD BEACH) AND
AH7010'STATION ON LEFT.  THE STATION IS 10 M (32.8 FT) SOUTH OF THE
AH7010'CENTERLINE OF SMITH-ANDERSON ROAD ON TOP OF DUNE.  THE STATION IS
AH7010'MARKED WITH A STANDARD PACIFIC COUNTY BRONZE DISK SET FLUSH WITH THE
AH7010'GROUND IN A ROUND CONCRETE MONUMENT.  THE UNDERGROUND MARK CONSISTS OF
AH7010'A 5/8 INCH REBAR WITH PLASTIC CAP SET IN CONCRETE 2.5 FT (0.8 M) BELOW
AH7010'THE SURFACE.  THERE ARE TWO REFERENCE MARKS FOR THIS STATION. REFERNCE
AH7010'MARK NO.  1 IS A PACIFIC COUNTY BRASS DISK STAMPED STA 068 RM 1 SET
AH7010'FLUSH WITH THE GROUND.  RM 1 IS 24.592 FT, (7.496 M) 248 DEGREES OF
AH7010'THE STATION.  REFERENCE MARK NO.  2 IS A PACIFIC COUNTY BRASS DISK
AH7010'STAMPED STA 068 RM 2 SET FLUSH WITH THE GROUND.  RM 2 IS 38.095 FT,
AH7010'(11.611 M) 184 DEGREES OF THE STATION.  BOTH REFERENCE MARKS HAVE
AH7010'STEEL WITNESS POSTS SET IN LINE WITH THE STATION.  POSTS ARE WITHIN 2
AH7010'FT (0.6 M) OF THE MARKS.  A 2 INCH GALVANIZED PIPE PROJECTING 6 FT
AH7010'(1.8 M) MARKS THE BASE OF THE DUNE ON THE OCEAN SIDE. THE PIPE IS
AH7010'86.87 FT (26.48 M) WEST OF THE STATION.
AH7010
AH7010                          STATION RECOVERY (1999)
AH7010
AH7010'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7010'RECOVERED AS DESCRIBED.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0780 ***********************************************************************
 SD0780  DESIGNATION -  PIER RM 1 AZ MK
 SD0780  PID         -  SD0780
 SD0780  STATE/COUNTY-  WA/GRAYS HARBOR
 SD0780  USGS QUAD   -  MOCLIPS (1985)
 SD0780
 SD0780                         *CURRENT SURVEY CONTROL
 SD0780  ______________________________________________________________________
 SD0780* NAD 83(1991)-  47 14 21.36360(N)    124 12 59.67787(W)     ADJUSTED
 SD0780* NAVD 88     -         7.13   (meters)      23.4    (feet)  GPS OBS
 SD0780  ______________________________________________________________________
 SD0780  X           -  -2,439,459.151 (meters)                     COMP
 SD0780  Y           -  -3,587,322.100 (meters)                     COMP
 SD0780  Z           -   4,659,852.690 (meters)                     COMP
 SD0780  LAPLACE CORR-           8.42  (seconds)                    DEFLEC96
 SD0780  ELLIP HEIGHT-         -17.27  (meters)                     GPS OBS
 SD0780  GEOID HEIGHT-         -24.21  (meters)                     GEOID96
 SD0780
 SD0780  HORZ ORDER  -  FIRST
 SD0780  ELLP ORDER  -  THIRD     CLASS II
 SD0780
 SD0780.The horizontal coordinates were established by GPS observations
 SD0780.and adjusted by the National Geodetic Survey in January 1999.
 SD0780
 SD0780.The orthometric height was determined by GPS observations and a
 SD0780.high-resolution geoid model using precise GPS observation and
 SD0780.processing techniques.
 SD0780
 SD0780.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0780
 SD0780.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0780
 SD0780.The ellipsoidal height was determined by GPS observations
 SD0780.and is referenced to NAD 83.
 SD0780
 SD0780.The geoid height was determined by GEOID96.
 SD0780
 SD0780;                    North         East     Units   Scale      Converg.
 SD0780;SPC WA S     -   218,480.556   218,706.174   MT  0.99997984 -2 41 58.9
 SD0780;UTM  10      - 5,232,471.377   407,923.262   MT  0.99970419 -0 53 35.8
 SD0780
 SD0780                           SUPERSEDED SURVEY CONTROL
 SD0780
 SD0780  NAD 83(1991)-  47 14 21.35464(N)    124 12 59.68405(W) AD(       ) 2
 SD0780  NAD 83(1986)-  47 14 21.34402(N)    124 12 59.68936(W) AD(       ) 2
 SD0780  NAD 27      -  47 14 22.04224(N)    124 12 55.04140(W) AD(       ) 2
 SD0780  NGVD 29     -         6.     (m)           20.     (f) VERT ANG
 SD0780
 SD0780.Superseded values are not recommended for survey control.
 SD0780.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
 SD0780.See file dsdata.txt to determine how the superseded data were derived.
 SD0780
 SD0780_MARKER: DZ = AZIMUTH MARK DISK
 SD0780_SETTING: 9 = SET IN PREFABRICATED CONCRETE POST IMBEDDED IN GROUND
 SD0780_STAMPING: PIER NO 1 1927
 SD0780_PROJECTION: FLUSH
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SD0780_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0780_STABILITY: D = MARK OF QUESTIONABLE OR UNKNOWN STABILITY
SD0780
SD0780  HISTORY     - Date     Condition        Recov. By
SD0780  HISTORY     - 1976     MONUMENTED       NGS
SD0780  HISTORY     - 19971015 GOOD             WADECO
SD0780
SD0780                          STATION DESCRIPTION
SD0780
SD0780'DESCRIBED BY NATIONAL GEODETIC SURVEY 1976
SD0780'TO REACH STATION PIER RM 1 FROM THE POST OFFICE IN MOCLIPS, GO NORTH
SD0780'ON STATE HIGHWAY 109 FOR 0.4 MILE TO THE T INTERSECTION ON THE NORTH
SD0780'SIDE OF THE MOCLIPS RIVER, TURN LEFT AND GO WEST 0.1 MILE TO THE
SD0780'AZIMUTH MARK IN THE NORTHEAST ANGLE OF A T-INTERSECTION.
SD0780'
SD0780'THE AZIMUTH MARK, STAMPED PIER NO 1 1927, IS A STANDARD DISK SET
SD0780'IN CONCRETE 2 INCHES BELOW GROUND, 41 FEET NORTH OF THE CENTER OF
SD0780'THE EAST-WEST STREET, 17.5 FEET EAST OF THE CENTER OF PACIFIC
SD0780'AVE., 62.2 FEET WEST-NORTHWEST OF THE SOUTHWEST CORNER AND 18.9
SD0780'FEET NORTH OF THE PROJECTED SOUTH SIDE OF THE HOUSE IN THE
SD0780'NORTHEAST ANGLE OF THE INTERSECTION.  41.5 FEET EAST OF UTILITY
SD0780'POLE NO. 31B/4580W/5N/1 AND 9.1 FEET NORTH-NORTHWEST OF A
SD0780'TELEPHONE POLE.
SD0780
SD0780                          STATION RECOVERY (1997)
SD0780
SD0780'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0780'RECOVERED AS DESCRIBED.  STATION WAS INSTALLED BY THE CGS IN 1953 (SEE
SD0780'DESCRIPTION FOR PIER RM 1 RESET) .  MARK IS UNDER A 7 FT (2.1 M) LONG
SD0780'SECTION OF TELEPHONE POLE AT THE NORTHEAST CORNER OF PACIFIC AND 2ND
SD0780'AVENUE IN MOCLIPS.  THE POLE MAY BE ROLLED ASSIDE TO GAIN ACCESS TO
SD0780'THE STATION.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7009 ***********************************************************************
 AH7009  DESIGNATION -  PRUG
 AH7009  PID         -  AH7009
 AH7009  STATE/COUNTY-  WA/GRAYS HARBOR
 AH7009  USGS QUAD   -  GRAYLAND (1985)
 AH7009
 AH7009                         *CURRENT SURVEY CONTROL
 AH7009  ______________________________________________________________________
 AH7009* NAD 83(1991)-  46 49 23.85724(N)    124 06 12.54841(W)     ADJUSTED
 AH7009* NAVD 88     -         8.33   (meters)      27.3    (feet)  GPS OBS
 AH7009  ______________________________________________________________________
 AH7009  X           -  -2,451,346.762 (meters)                     COMP
 AH7009  Y           -  -3,620,149.618 (meters)                     COMP
 AH7009  Z           -   4,628,333.506 (meters)                     COMP
 AH7009  LAPLACE CORR-          14.19  (seconds)                    DEFLEC96
 AH7009  ELLIP HEIGHT-         -16.15  (meters)                     GPS OBS
 AH7009  GEOID HEIGHT-         -24.33  (meters)                     GEOID96
 AH7009
 AH7009  HORZ ORDER  -  FIRST
 AH7009  ELLP ORDER  -  THIRD     CLASS II
 AH7009
 AH7009.The horizontal coordinates were established by GPS observations
 AH7009.and adjusted by the National Geodetic Survey in January 1999.
 AH7009
 AH7009.The orthometric height was determined by GPS observations and a
 AH7009.high-resolution geoid model using precise GPS observation and
 AH7009.processing techniques.
 AH7009
 AH7009.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7009
 AH7009.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7009
 AH7009.The ellipsoidal height was determined by GPS observations
 AH7009.and is referenced to NAD 83.
 AH7009
 AH7009.The geoid height was determined by GEOID96.
 AH7009
 AH7009;                    North         East     Units   Scale      Converg.
 AH7009;SPC WA S     -   171,889.637   225,147.769   MT  0.99992322 -2 37 03.2
 AH7009;UTM  10      - 5,186,118.790   415,831.000   MT  0.99968707 -0 48 17.1
 AH7009
 AH7009                           SUPERSEDED SURVEY CONTROL
 AH7009
 AH7009.No superseded survey control is available for this station.
 AH7009
 AH7009_MARKER: I = METAL ROD
 AH7009_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 AH7009_STAMPING: PRUG 1997
 AH7009_PROJECTION: RECESSED 10 CENTIMETERS
 AH7009_MAGNETIC: I = MARKER IS A STEEL ROD
 AH7009_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
 AH7009_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7009+SATELLITE: SATELLITE OBSERVATIONS - 1997
 AH7009_ROD/PIPE-DEPTH: 10   meters
 AH7009
 AH7009  HISTORY     - Date     Condition        Recov. By
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AH7009  HISTORY     - 1997     MONUMENTED       NGS
AH7009
AH7009                          STATION DESCRIPTION
AH7009
AH7009'DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH7009'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .
AH7009'THE STATION IS LOCATED 0.3 MILES (0.5 KM) NORTH OF THE CITY OF
AH7009'GRAYLAND.  FROM THE GRAYLAND CITY LIMIT SIGN ON THE NORTH END OF TOWN
AH7009'GO NORTH 0.3 MILES (0.5 KM) ON SR 105 TO MARINE DRIVE.  TURN WEST AND
AH7009'FOLLOW MARINE DRIVE TO A T INTERSECTION WITH SALT AIRE BOULEVARD. THE
AH7009'STATION IS 71 M (232.9 FT) WEST OF THE CENTERLINE OF SALT AIRE
AH7009'BOULEVARD AND 4 M (13.1 FT) NORTH OF THE EXTENDED CENTERLINE OF MARINE
AH7009'DRIVE, OR 75 M (246.1 FT) WEST (319 DEGREES GRID) FROM THE CENTER OF
AH7009'THE INTERSECTION OF SALT AIR BOULEVARD AND MARINE DRIVE AND ON-LINE
AH7009'WITH THE EXTENDED NORTH EDGE OF MARINE DRIVE.  THE STATION IS CENTERED
AH7009'BETWEEN TWO ORANGE NGS WITNESS POSTS WHICH ARE 1 M (3.3 FT) SOUTH AND
AH7009'1 M (3.3 FT) NORTH OF THE STATION.  THE STATION IS A STAINLESS STEEL
AH7009'ROD DRIVEN 81 FT. (24.7 M) ACCESS TO THE DATUM POINT IS HAD THROUGH A
AH7009'STANDARD 5-INCH NGS LOGO CAP THAT IS STAMPED PRUG 1997.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0117 ***********************************************************************
 SD0117  DESIGNATION -  R 443
 SD0117  PID         -  SD0117
 SD0117  STATE/COUNTY-  WA/GRAYS HARBOR
 SD0117  USGS QUAD   -  MOCLIPS (1985)
 SD0117
 SD0117                         *CURRENT SURVEY CONTROL
 SD0117  ______________________________________________________________________
 SD0117* NAD 83(1991)-  47 11 26.32142(N)    124 07 37.44146(W)     ADJUSTED
 SD0117* NAVD 88     -        32.988  (meters)     108.23   (feet)  ADJUSTED
 SD0117  ______________________________________________________________________
 SD0117  X           -  -2,436,087.543 (meters)                     COMP
 SD0117  Y           -  -3,594,427.437 (meters)                     COMP
 SD0117  Z           -   4,656,199.990 (meters)                     COMP
 SD0117  LAPLACE CORR-          10.39  (seconds)                    DEFLEC96
 SD0117  ELLIP HEIGHT-           8.72  (meters)                     GPS OBS
 SD0117  GEOID HEIGHT-         -24.07  (meters)                     GEOID96
 SD0117  DYNAMIC HT  -          32.993 (meters)     108.24  (feet)  COMP
 SD0117  MODELED GRAV-     980,748.3   (mgal)                       NAVD 88
 SD0117
 SD0117  HORZ ORDER  -  FIRST
 SD0117  VERT ORDER  -  SECOND    CLASS I
 SD0117  ELLP ORDER  -  THIRD     CLASS II
 SD0117
 SD0117.The horizontal coordinates were established by GPS observations
 SD0117.and adjusted by the National Geodetic Survey in January 1999.
 SD0117
 SD0117.The orthometric height was determined by differential leveling
 SD0117.and adjusted by the National Geodetic Survey in June 1991.
 SD0117
 SD0117.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0117
 SD0117.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0117
 SD0117.The ellipsoidal height was determined by GPS observations
 SD0117.and is referenced to NAD 83.
 SD0117
 SD0117.The geoid height was determined by GEOID96.
 SD0117
 SD0117.The dynamic height is computed by dividing the NAVD 88
 SD0117.geopotential number by the normal gravity value computed on the
 SD0117.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 SD0117.degrees latitude (G = 980.6199 gals.).
 SD0117
 SD0117.The modeled gravity was interpolated from observed gravity values.
 SD0117
 SD0117;                    North         East     Units   Scale      Converg.
 SD0117;SPC WA S     -   212,765.386   225,227.546   MT  0.99997048 -2 38 04.9
 SD0117;UTM  10      - 5,226,966.235   414,619.754   MT  0.99968959 -0 49 36.8
 SD0117
 SD0117                           SUPERSEDED SURVEY CONTROL
 SD0117
 SD0117  NGVD 29     -        31.966  (m)          104.88   (f) ADJ UNCH    2 1
 SD0117
 SD0117.Superseded values are not recommended for survey control.
 SD0117.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
```

SD0117.See file dsdata.txt to determine how the superseded data were derived.
SD0117
SD0117_MARKER: DB = BENCH MARK DISK
SD0117_SETTING: 17 = SET INTO TOP OF METAL PIPE DRIVEN INTO GROUND
SD0117_STAMPING: R 443 1977
SD0117_PROJECTION: FLUSH
SD0117_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0117_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0117+STABILITY: SURFACE MOTION
SD0117_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SD0117+SATELLITE: SATELLITE OBSERVATIONS - June 19, 1998
SD0117
SD0117 HISTORY   - Date   Condition   Recov. By
SD0117 HISTORY   - 1977   MONUMENTED   NGS
SD0117 HISTORY   - 19770718 GOOD   WADECO
SD0117 HISTORY   - 1987   GOOD   USPSQD
SD0117 HISTORY   - 19980619 GOOD   NGS
SD0117
SD0117   STATION DESCRIPTION
SD0117
SD0117'DESCRIBED BY NATIONAL GEODETIC SURVEY 1977
SD0117'2.05 MI SE FROM ALOHA.
SD0117'2.05 MILES SOUTHEAST ALONG OCEAN BEACH ROAD FROM THE POST OFFICE
SD0117'AT ALOHA, 29 FT NORTHEAST OF THE CENTER LINE OF THE ROAD AND 4
SD0117'FT EAST OF POWER POLE 197 THAT IS NORTHWEST OF A GRAVELED ROAD.
SD0117'A DISK ON TOP OF AN ALUMINUM ROD, ACCESS HAD THROUGH A 4-INCH
SD0117'PLASTIC CAP ENCASED IN CONCRETE.
SD0117
SD0117   STATION RECOVERY (1977)
SD0117
SD0117'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1977 (RCD)
SD0117'RECOVERED AS DESCRIBED. FROM THE NEW POST OFFICE IN COPALIS CROSSING,
SD0117'GO NORWEST 6.3 MILES (10.1 KM) ON OCEAN BEACH ROAD TO CURVE TO WEST
SD0117'AND STATION ON RIGHT. STATION IS 1 METER (3.3 FT) SOUTHEAST OF A
SD0117'PLASTIC WITNESS POST.
SD0117
SD0117   STATION RECOVERY (1987)
SD0117
SD0117'RECOVERY NOTE BY US POWER SQUADRON 1987 (REW)
SD0117'RECOVERED IN GOOD CONDITION.
SD0117
SD0117   STATION RECOVERY (1998)
SD0117
SD0117'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1998 (GAS)
SD0117'5.9 KM (3.65 MI) SOUTHEASTERLY ALONG OCEAN BEACH ROAD FROM THE POST
SD0117'OFFICE IN PACIFIC BEACH, 99.0 M (324.8 FT) NORTHWEST OF THE CENTER OF
SD0117'A GRAVELED ROAD LEADING NORTH, 8.7 M (28.5 FT) NORTHEAST OF THE ROAD
SD0117'CENTERLINE, 1.0 M (3.3 FT) NORTHEAST OF UTILITY POLE NUMBER 19 7, 0.8
SD0117'M (2.6 FT) SOUTH OF A WITNESS POST, AND 0.4 M (1.3 FT) BELOW THE LEVEL
SD0117'OF THE ROAD. NOTE--ACCESS TO THE DISK IS THROUGH A 4-INCH PVC SCREW
SD0117'CAP. THE MONUMENT IS ON ROAD RIGHT-OF-WAY.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7008 ***********************************************************************
 AH7008  DESIGNATION -  RDAN
 AH7008  PID         -  AH7008
 AH7008  STATE/COUNTY-  WA/GRAYS HARBOR
 AH7008  USGS QUAD   -  GRAYLAND (1985)
 AH7008
 AH7008                         *CURRENT SURVEY CONTROL
 AH7008  ______________________________________________________________________
 AH7008* NAD 83(1991)-  46 50 58.20431(N)    124 06 37.53867(W)     ADJUSTED
 AH7008* NAVD 88     -         6.05   (meters)      19.8    (feet)  GPS OBS
 AH7008  ______________________________________________________________________
 AH7008  X           -  -2,450,592.748 (meters)                     COMP
 AH7008  Y           -  -3,618,091.823 (meters)                     COMP
 AH7008  Z           -   4,630,324.839 (meters)                     COMP
 AH7008  LAPLACE CORR-          13.61  (seconds)                    DEFLEC96
 AH7008  ELLIP HEIGHT-         -18.47  (meters)                     GPS OBS
 AH7008  GEOID HEIGHT-         -24.36  (meters)                     GEOID96
 AH7008
 AH7008  HORZ ORDER  -  FIRST
 AH7008  ELLP ORDER  -  THIRD     CLASS II
 AH7008
 AH7008.The horizontal coordinates were established by GPS observations
 AH7008.and adjusted by the National Geodetic Survey in January 1999.
 AH7008
 AH7008.The orthometric height was determined by GPS observations and a
 AH7008.high-resolution geoid model using precise GPS observation and
 AH7008.processing techniques.
 AH7008
 AH7008.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7008
 AH7008.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7008
 AH7008.The ellipsoidal height was determined by GPS observations
 AH7008.and is referenced to NAD 83.
 AH7008
 AH7008.The geoid height was determined by GEOID96.
 AH7008
 AH7008;                    North         East     Units   Scale      Converg.
 AH7008;SPC WA S     -   174,824.006   224,751.964   MT  0.99992523 -2 37 21.4
 AH7008;UTM  10      - 5,189,038.479   415,342.692   MT  0.99968809 -0 48 36.6
 AH7008
 AH7008                           SUPERSEDED SURVEY CONTROL
 AH7008
 AH7008.No superseded survey control is available for this station.
 AH7008
 AH7008_MARKER: I = METAL ROD
 AH7008_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 AH7008_STAMPING: RDAN 1997
 AH7008_PROJECTION: RECESSED 10 CENTIMETERS
 AH7008_MAGNETIC: I = MARKER IS A STEEL ROD
 AH7008_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
 AH7008_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7008+SATELLITE: SATELLITE OBSERVATIONS - 1997
 AH7008_ROD/PIPE-DEPTH: 10   meters
 AH7008
 AH7008  HISTORY     - Date     Condition        Recov. By
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AH7008 HISTORY   - 1997   MONUMENTED   NGS
AH7008
AH7008   STATION DESCRIPTION
AH7008
AH7008'DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH7008'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .
AH7008'THE STATION IS LOCATED SOUTH OF THE CITY OF WESTPORT AT THE SOUTHERN
AH7008'BOUNDARY OF TWIN HARBORS STATE PARK. FROM THE INTERSECTION OF SR 105
AH7008'AND SR 105 SPUR IN WESTPORT GO SOUTH 1.4 MILES (2.3 KM) TO BONG AVENUE
AH7008'(YELLOW HOUSE ON CORNER, CURRENTLY A KITE STORE) . TURN WEST AND
AH7008'FOLLOW BONG AVENUE TO BEACH ACCESS PARKING AREA ON RIGHT AND WOOD
AH7008'FRAME RESTROOMS ON THE WEST SIDE OF LOT. THE STATION IS 34 M (111.5
AH7008'FT) SOUTHWEST (270 DEGREES GRID) OF THE SOUTHWEST CORNER OF THE
AH7008'RESTROOMS AND 1 M (3.3 FT) SOUTH OF A ORANGE NGS WITNESS POST, OR 7.25
AH7008'M (23.79 FT) NORTH OF THE CENTERLINE OF BONG AVENUE AND 150 M (492.1
AH7008'FT) WEST OF THE EXTENDED CENTERLINE OF SEASHORE AVENUE. THE STATION
AH7008'IS A STAINLESS STEEL ROD DRIVEN 67 FT. (20.4 M) ACCESS TO THE DATUM
AH7008'POINT IS HAD THROUGH A STANDARD 5-INCH NGS LOGO CAP THAT IS STAMPED
AH7008'RDAN 1997.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0563 ***********************************************************************
 SD0563  DESIGNATION -  RICH
 SD0563  PID         -  SD0563
 SD0563  STATE/COUNTY-  WA/PACIFIC
 SD0563  USGS QUAD   -  OCEAN PARK (1985)
 SD0563
 SD0563                         *CURRENT SURVEY CONTROL
 SD0563  ______________________________________________________________________
 SD0563* NAD 83(1991)-  46 24 50.49900(N)    124 03 27.94102(W)     ADJUSTED
 SD0563* NAVD 88     -         7.48   (meters)      24.5    (feet)  GPS OBS
 SD0563  ______________________________________________________________________
 SD0563  X           -  -2,466,974.506 (meters)                     COMP
 SD0563  Y           -  -3,649,498.514 (meters)                     COMP
 SD0563  Z           -   4,597,084.584 (meters)                     COMP
 SD0563  LAPLACE CORR-          15.58  (seconds)                    DEFLEC96
 SD0563  ELLIP HEIGHT-         -16.84  (meters)                     GPS OBS
 SD0563  GEOID HEIGHT-         -24.18  (meters)                     GEOID96
 SD0563
 SD0563  HORZ ORDER  -  FIRST
 SD0563  ELLP ORDER  -  THIRD     CLASS II
 SD0563
 SD0563.The horizontal coordinates were established by GPS observations
 SD0563.and adjusted by the National Geodetic Survey in January 1999.
 SD0563
 SD0563.The orthometric height was determined by GPS observations and a
 SD0563.high-resolution geoid model using precise GPS observation and
 SD0563.processing techniques.
 SD0563
 SD0563.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0563
 SD0563.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0563
 SD0563.The ellipsoidal height was determined by GPS observations
 SD0563.and is referenced to NAD 83.
 SD0563
 SD0563.The geoid height was determined by GEOID96.
 SD0563
 SD0563;                    North         East     Units   Scale      Converg.
 SD0563;SPC WA S     -   126,285.947   226,581.743   MT  0.99991904 -2 35 03.6
 SD0563;UTM  10      - 5,140,594.021   418,708.356   MT  0.99968123 -0 45 58.4
 SD0563
 SD0563:                Primary Azimuth Mark                    Grid Az
 SD0563:SPC WA S     -  NORTH HEAD LH                           189 31 31.3
 SD0563:UTM  10      -  NORTH HEAD LH                           187 42 26.1
 SD0563
 SD0563|---------------------------------------------------------------------|
 SD0563| PID    Reference Object                    Distance      Geod. Az   |
 SD0563|                                                          dddmmss.s  |
 SD0563|        RICH RM 1                           35.366 METERS 02857      |
 SD0563|        RICH RM 2                           28.493 METERS 14147      |
 SD0563| SD0604 NORTH HEAD LH                      APPROX.12.9 KM 1865627.7  |
 SD0563|---------------------------------------------------------------------|
 SD0563
 SD0563                          SUPERSEDED SURVEY CONTROL
 SD0563
 SD0563  NAD 83(1991)-  46 24 50.49505(N)    124 03 27.94595(W) AD(       ) 2
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SD0563  NAD 83(1991)-  46 24 50.49469(N)    124 03 27.94565(W) AD(       ) 2
SD0563  NAD 83(1986)-  46 24 50.49770(N)    124 03 27.92287(W) AD(       ) 2
SD0563  NAD 27      -  46 24 51.14236(N)    124 03 23.34510(W) AD(       ) 2
SD0563  NGVD 29     -         6.7    (m)           22.     (f) VERT ANG
SD0563
SD0563.Superseded values are not recommended for survey control.
SD0563.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0563.See file dsdata.txt to determine how the superseded data were derived.
SD0563
SD0563_MARKER: DS = TRIANGULATION STATION DISK
SD0563_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
SD0563_PROJECTION: FLUSH
SD0563_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0563_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0563+STABILITY: SURFACE MOTION
SD0563
SD0563  HISTORY     - Date     Condition        Recov. By
SD0563  HISTORY     - 1976     MONUMENTED       NGS
SD0563  HISTORY     - 19971015 GOOD             WADECO
SD0563
SD0563                          STATION DESCRIPTION
SD0563
SD0563'DESCRIBED BY NATIONAL GEODETIC SURVEY 1976 (CLN)
SD0563'THE STATION IS LOCATED 3-1/2 MILES NORTH OF LONG BEACH ON THE OCEAN
SD0563'BEACH, .27 MILE WEST OF STATE HIGHWAY 103.
SD0563'
SD0563'TO REACH STATION FROM THE CRANBERRY ROAD BEACH APPROACH (LOCATED 2.95
SD0563'MILES NORTH OF THE BLINKER LIGHT AT 1ST AND PACIFIC IN LONG BEACH)
SD0563'GO NORTH ALONG THE BEACH 1.3 MILES, THEN TURN RIGHT AND GO EAST 350
SD0563'FEET TO THE WESTERLY MOST SAND DUNE AND STATION.
SD0563'
SD0563'THE STATION MARK IS A STANDARD DISK STAMPED RICH 1976 SET IN AN 8
SD0563'INCH DIAMETER CONCRETE CYLINDER FLUSH TO THE GROUND.  IT IS 63.67
SD0563'FEET EAST OF A 2 INCH PIPE MARKING THE WESTERLY MOST GRASSLINE.
SD0563'
SD0563'THE SUBSURFACE MARK IS A STANDARD DISK STAMPED RICH 1976 SET IN AN
SD0563'IRREGULAR MASS OF CONCRETE 4.0 FEET BELOW THE SURFACE.
SD0563'
SD0563'REFERENCE MARK NO. 1 IS A STANDARD DISK STAMPED RICH 1976 R.M. NO. 1
SD0563'SET IN AN 8 INCH DIAMETER CONCRETE CYLINDER PROJECTING 6 INCHES
SD0563'ABOVE GROUND.
SD0563'
SD0563'REFERENCE MARK NO. 2 IS A STANDARD DISK STAMPED RICH 1976 R.M. NO. 2
SD0563'SET IN AN 8 INCH DIAMETER CONCRETE CYLINDER PROJECTING 4 INCHES
SD0563'ABOVE GROUND.
SD0563'
SD0563'NEAREST TOWN--LONG BEACH.
SD0563
SD0563                          STATION RECOVERY (1997)
SD0563
SD0563'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0563'RECOVERED AS DESCRIBED.  STATION AND REFERENCE MARKS RECOVERED.
SD0563'ALTERNATE TO REACH FOLLOWS.  FROM LONG BEACH PROCEED NORTH ON SR 103
SD0563'TO 158TH PLACE AND STEEL GATE ON LEFT (BUTTERFLY SHORES SUBDIVISION) .
SD0563'PROCEED WEST THROUGH GATE ON 158TH PLACE TO M PLACE.  GO SOUTH ON M
SD0563'PLACE TO 155TH PLACE.  GO WEST ON 155TH PLACE TO K PLACE.  GO SOUTH ON
SD0563'K PLACE TO STATION ON RIGHT.  STATION IS ON THE WEST SIDE OF ROAD AND
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SD0563'ABOUT 30 M (98.4 FT) NORTH OF THE VEHICLE TURN AROUND AT THE END OF K
SD0563'PLACE. THE STATION IS 0.6 M (2.0 FT) BELOW GROUND AND MARKED BY A
SD0563'WITNESS POST

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7030 ***********************************************************************
 AH7030  DESIGNATION -  RILEA
 AH7030  PID         -  AH7030
 AH7030  STATE/COUNTY-  OR/CLATSOP
 AH7030  USGS QUAD   -  GEARHART (1984)
 AH7030
 AH7030                        *CURRENT SURVEY CONTROL
 AH7030  ______________________________________________________________________
 AH7030* NAD 83(1991)-  46 06 49.73570(N)    123 56 47.07666(W)     ADJUSTED
 AH7030* NAVD 88     -        13.0    (meters)      43.     (feet)  GPS OBS
 AH7030  ______________________________________________________________________
 AH7030  X           -  -2,473,343.786 (meters)                     COMP
 AH7030  Y           -  -3,674,291.345 (meters)                     COMP
 AH7030  Z           -   4,574,018.934 (meters)                     COMP
 AH7030  LAPLACE CORR-          15.45  (seconds)                    DEFLEC96
 AH7030  ELLIP HEIGHT-         -10.54  (meters)                     GPS OBS
 AH7030  GEOID HEIGHT-         -23.44  (meters)                     GEOID96
 AH7030
 AH7030  HORZ ORDER  -  FIRST
 AH7030  ELLP ORDER  -  THIRD     CLASS II
 AH7030
 AH7030.The horizontal coordinates were established by GPS observations
 AH7030.and adjusted by the National Geodetic Survey in January 1999.
 AH7030
 AH7030.The orthometric height was determined by GPS observations.
 AH7030
 AH7030.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7030
 AH7030.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7030
 AH7030.The ellipsoidal height was determined by GPS observations
 AH7030.and is referenced to NAD 83.
 AH7030
 AH7030.The geoid height was determined by GEOID96.
 AH7030
 AH7030;                     North         East     Units   Scale      Converg.
 AH7030;SPC OR N     -   277,627.671 2,233,650.169   MT  1.00003094 -2 26 38.9
 AH7030;UTM  10      - 5,107,128.630   426,867.796   MT  0.99966575 -0 40 55.7
 AH7030
 AH7030                           SUPERSEDED SURVEY CONTROL
 AH7030
 AH7030.No superseded survey control is available for this station.
 AH7030
 AH7030_MARKER: I = METAL ROD
 AH7030_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 AH7030_STAMPING: RILEA 1997
 AH7030_PROJECTION: RECESSED 10 CENTIMETERS
 AH7030_MAGNETIC: I = MARKER IS A STEEL ROD
 AH7030_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
 AH7030_ROD/PIPE-DEPTH: 10   meters
 AH7030
 AH7030  HISTORY     - Date     Condition        Recov. By
 AH7030  HISTORY     - 1997     MONUMENTED       NGS
 AH7030
 AH7030                           STATION DESCRIPTION
 AH7030
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AH7030'DESCRIBED BY NATIONAL GEODETIC SURVEY 1997 (RCD)
AH7030'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .
AH7030'THE STATION IS ON THE FIRST DUNE LINE AT THE SOUTHERN END OF THE CAMP
AH7030'RILEA NATIONAL GUARD BASE. TO REACH FROM THE MAIN GATE AT CAMP RILEA
AH7030'GO SOUTH 1.6 MILES (2.6 KM) ON US 101/26 TO SUNSET BEACH ROAD. TURN
AH7030'WEST ONTO SUNSET BEACH AND FOLLOW TO BEACH ACCESS. FROM BEACH ACCESS
AH7030'POINT GO NORTH ON BEACH FOR 1.09 MILES (1.75 KM) TO A LONE TELEPHONE
AH7030'POLE AND DUNE ON RIGHT AND STATION. THE STATION IS 40 M (131.2 FT)
AH7030'SOUTHEAST (113 DEGREES GRID) OF THE TELEPHONE POLE, 8.5 M (27.9 FT)
AH7030'SOUTH OF THE SOUTHERN MOST OF TWO 6-INCH DIAMETER STEEL POSTS (PART OF
AH7030'A OLD GATE) , 1.5 M (4.9 FT) NORTH OF A STEEL U-SHAPED PICKET, AND
AH7030'CENTERED BETWEEN TWO ORANGE NGS WITNESS POSTS. THE WITNESS POSTS ARE
AH7030'1 M (3.3 FT) WEST AND 1 M (3.3 FT) EAST OF THE STATION. THE STATION
AH7030'IS 62 M (203.4 FT) SOUTHWEST (254 DEGREES GRID) FROM A NEW GALVANIZED
AH7030'STEEL FARM GATE THAT BLOCKS ACCESS INTO THE NATIONAL GUARD BASE FROM
AH7030'THE OCEAN SIDE VIA SLUSHER LAKE ROAD. THE STATION IS A STAINLESS
AH7030'STEEL ROD DRIVEN 74 FT, (22.6 M) ACCESS TO THE DATUM POINT IS HAD
AH7030'THROUGH A 5-INCH STANDARD NGS LOGO CAP THAT IS STAMPED RILEA 1997.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AF9503 ***********************************************************************
 AF9503  CORS         -  This is a GPS Continuously Operating Reference Station.
 AF9503  DESIGNATION -  ROBINSON POINT 1 CORS ARP
 AF9503  CORS_ID      -  RPT1
 AF9503  PID          -  AF9503
 AF9503  STATE/COUNTY-  WA/KING
 AF9503  USGS QUAD    -  POVERTY BAY (1981)
 AF9503
 AF9503                         *CURRENT SURVEY CONTROL
 AF9503  ______________________________________________________________________
 AF9503* NAD 83(CORS)-  47 23 15.00509(N)    122 22 29.10144(W)     ADJUSTED
 AF9503* NAVD 88      -
 AF9503  ______________________________________________________________________
 AF9503  EPOCH DATE   -        1997.00
 AF9503  X            -  -2,316,417.118 (meters)                    COMP
 AF9503  Y            -  -3,653,647.280 (meters)                    COMP
 AF9503  Z            -   4,671,031.737 (meters)                    COMP
 AF9503  ELLIP HEIGHT-          -9.50  (meters)                    GPS OBS
 AF9503  GEOID HEIGHT-         -22.48  (meters)                    GEOID96
 AF9503
 AF9503  HORZ ORDER   -  SPECIAL (CORS)
 AF9503  ELLP ORDER   -  SPECIAL (CORS)
 AF9503
 AF9503.ITRF positions available for this station.
 AF9503.The coordinates were established by GPS observations
 AF9503.and adjusted by the National Geodetic Survey in April 1996.
 AF9503.The coordinates are valid at the epoch date displayed above.
 AF9503.The epoch date for horizontal control is a decimal equivalence
 AF9503.of Year/Month/Day.
 AF9503
 AF9503
 AF9503.The XYZ, and position/ellipsoidal ht. are equivalent.
 AF9503
 AF9503.The ellipsoidal height was determined by GPS observations
 AF9503.and is referenced to NAD 83.
 AF9503
 AF9503.The geoid height was determined by GEOID96.
 AF9503
 AF9503;                    North         East     Units   Scale      Converg.
 AF9503;SPC WA N      -    44,249.021   383,621.397   MT  1.00002288 -1 08 51.4
 AF9503
 AF9503                         SUPERSEDED SURVEY CONTROL
 AF9503
 AF9503  NAD 83(CORS)-  47 23 15.00503(N)    122 22 29.10170(W) AD(1996.00) c
 AF9503  ELLIP HT     -          -9.50  (m)                     GP(1996.00) c c
 AF9503
 AF9503.Superseded values are not recommended for survey control.
 AF9503.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
 AF9503.See file dsdata.txt to determine how the superseded data were derived.
 AF9503
 AF9503_STATION IS THE ANTENNA REFERENCE POINT OF THE GPS ANTENNA
 AF9503
 AF9503                         STATION DESCRIPTION
 AF9503
 AF9503'DESCRIBED BY NATIONAL GEODETIC SURVEY 1996
 AF9503'STATION IS A GPS CORS.  LATEST INFORMATION INCLUDING POSITIONS AND
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AF9503'VELOCITIES ARE AVAILABLE IN THE COORDINATE AND LOG FILES ACCESSIBLE
AF9503'BY ANONYMOUS FTP OR THE WORLDWIDE WEB.
AF9503'   FTP CORS.NGS.NOAA.GOV: CORS/COORD  AND  CORS/STATION_LOG
AF9503'   HTTP://WWW.NGS.NOAA.GOV  UNDER PRODUCTS AND SERVICES.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 RD1141 ***********************************************************************
 RD1141  DESIGNATION -  SEASIDE RM 2
 RD1141  PID         -  RD1141
 RD1141  STATE/COUNTY-  OR/CLATSOP
 RD1141  USGS QUAD   -  TILLAMOOK HEAD (1978)
 RD1141
 RD1141                         *CURRENT SURVEY CONTROL
 RD1141  ______________________________________________________________________
 RD1141* NAD 83(1991)-  45 59 42.29185(N)    123 55 46.38544(W)     ADJUSTED
 RD1141* NAVD 88     -         7.297  (meters)      23.94   (feet)  ADJUSTED
 RD1141  ______________________________________________________________________
 RD1141  X           -  -2,477,564.347 (meters)                     COMP
 RD1141  Y           -  -3,682,900.051 (meters)                     COMP
 RD1141  Z           -   4,564,856.219 (meters)                     COMP
 RD1141  LAPLACE CORR-          17.17  (seconds)                    DEFLEC96
 RD1141  ELLIP HEIGHT-         -15.99  (meters)                     GPS OBS
 RD1141  GEOID HEIGHT-         -23.03  (meters)                     GEOID96
 RD1141  DYNAMIC HT  -           7.297 (meters)      23.94  (feet)  COMP
 RD1141  MODELED GRAV-     980,705.6   (mgal)                       NAVD 88
 RD1141
 RD1141  HORZ ORDER  -  FIRST
 RD1141  VERT ORDER  -  FIRST     CLASS II
 RD1141  ELLP ORDER  -  THIRD     CLASS II
 RD1141
 RD1141.The horizontal coordinates were established by GPS observations
 RD1141.and adjusted by the National Geodetic Survey in January 1999.
 RD1141
 RD1141.The orthometric height was determined by differential leveling
 RD1141.and adjusted by the National Geodetic Survey in June 1991.
 RD1141.WARNING-GPS observations at this control monument resulted in a GPS
 RD1141.derived orthometric height which differed from the leveled height by
 RD1141.more than one decimeter (0.1 meter).
 RD1141
 RD1141.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 RD1141
 RD1141.The Laplace correction was computed from DEFLEC96 derived deflections.
 RD1141
 RD1141.The ellipsoidal height was determined by GPS observations
 RD1141.and is referenced to NAD 83.
 RD1141
 RD1141.The geoid height was determined by GEOID96.
 RD1141
 RD1141.The dynamic height is computed by dividing the NAVD 88
 RD1141.geopotential number by the normal gravity value computed on the
 RD1141.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 RD1141.degrees latitude (G = 980.6199 gals.).
 RD1141
 RD1141.The modeled gravity was interpolated from observed gravity values.
 RD1141
 RD1141;                    North         East     Units   Scale      Converg.
 RD1141;SPC OR N     -   264,386.314 2,234,392.203   MT  0.99999875 -2 25 55.9
 RD1141;UTM  10      - 5,093,920.987   428,016.403   MT  0.99966370 -0 40 07.1
 RD1141
 RD1141                           SUPERSEDED SURVEY CONTROL
 RD1141
 RD1141  NGVD 29     -         6.202  (m)           20.35   (f) ADJ UNCH    1 2
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RD1141
RD1141.Superseded values are not recommended for survey control.
RD1141.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
RD1141.See file dsdata.txt to determine how the superseded data were derived.
RD1141
RD1141_MARKER: DR = REFERENCE MARK DISK
RD1141_SETTING: 32 = SEAWALL
RD1141_STAMPING: 20.348 1926
RD1141_PROJECTION: FLUSH
RD1141_MAGNETIC: O = OTHER; SEE DESCRIPTION
RD1141_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
RD1141+STABILITY: SURFACE MOTION
RD1141_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
RD1141+SATELLITE: SATELLITE OBSERVATIONS - March 10, 1993
RD1141
RD1141  HISTORY     - Date     Condition        Recov. By
RD1141  HISTORY     - 1926     MONUMENTED       CGS
RD1141  HISTORY     - 1965     GOOD             NGS
RD1141  HISTORY     - 1984     GOOD             USPSQD
RD1141  HISTORY     - 1987     GOOD             NGS
RD1141  HISTORY     - 19930310 GOOD             NGS
RD1141  HISTORY     - 19971205 GOOD             WADECO
RD1141
RD1141                          STATION DESCRIPTION
RD1141
RD1141'DESCRIBED BY NATIONAL GEODETIC SURVEY 1965
RD1141'IN SEASIDE.
RD1141'AT SEASIDE, AT THE EXTREME WEST END OF SECOND AVENUE, AT THE WEST EDGE
RD1141'OF THE SIDEWALK, AT THE TOP OF THE PROMENADE STEPS LEADING DOWN TO THE
RD1141'BEACH, CEMENTED IN A DRILL HOLE IN THE SIDEWALK.
RD1141
RD1141                          STATION RECOVERY (1984)
RD1141
RD1141'RECOVERY NOTE BY US POWER SQUADRON 1984
RD1141'RECOVERED IN GOOD CONDITION.
RD1141
RD1141                          STATION RECOVERY (1987)
RD1141
RD1141'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1987
RD1141'RECOVERED IN GOOD CONDITION, A NEW DESCRIPTION FOLLOWS.  IN SEASIDE,
RD1141'AT THE INTERSECTION OF 2ND AVENUE AND COLUMBIA STREET, IN THE NORTH
RD1141'END OF THE FIRST STEP OF A SET OF STEPS LEADING TO THE BEACH AT THE
RD1141'EXTREME WEST END OF THE AVENUE, 198.2 M (650.3 FT) WEST OF THE CENTER
RD1141'OF THE STREET, 8.6 M (28.2 FT) NORTHWEST OF THE NORTHWEST CORNER OF
RD1141'THE OCEAN FRONT MOTEL, 8.5 M (27.9 FT) SOUTHEAST OF THE SOUTHEAST
RD1141'CORNER OF THE AQUARIUM BUILDING, 2.2 M (7.2 FT) WEST OF THE CENTER OF
RD1141'THE BEACH WALKWAY, AND 0.9 M (3.0 FT) NORTH OF THE EXTENDED CENTER OF
RD1141'THE AVENUE.NOTE--THIS IS A REFERENCE MARK DISK AND THE ONLY STAMPING
RD1141'ON THE DISK IS 20.348 1926.
RD1141'THE MARK IS ABOVE LEVEL WITH THE AVENUE.
RD1141
RD1141                          STATION RECOVERY (1993)
RD1141
RD1141'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1993 (LLR)
RD1141'RECOVERED AS DESCRIBED.
RD1141
RD1141                          STATION RECOVERY (1997)
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RD1141
RD1141'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
RD1141'RECOVERED AS DESCRIBED. THE STATION IS ABOUT 5 M (16.4 FT) SOUTHWEST
RD1141'OF THE SOUTHWEST CORNER OF THE SEASIDE AQUARIUM.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AB2106 ***********************************************************************
 AB2106  FBN         -  This is a Federal Base Network Control Station.
 AB2106  DESIGNATION -  SMUR
 AB2106  PID         -  AB2106
 AB2106  STATE/COUNTY-  OR/CLATSOP
 AB2106  USGS QUAD   -  WARRENTON (1985)
 AB2106
 AB2106                        *CURRENT SURVEY CONTROL
 AB2106  ______________________________________________________________________
 AB2106* NAD 83(1991)-  46 12 23.30948(N)    123 57 32.25720(W)     ADJUSTED
 AB2106* NAVD 88     -         7.669  (meters)      25.16   (feet)  ADJUSTED
 AB2106  ______________________________________________________________________
 AB2106  X           -  -2,469,996.640 (meters)                     COMP
 AB2106  Y           -  -3,667,584.513 (meters)                     COMP
 AB2106  Z           -   4,581,148.730 (meters)                     COMP
 AB2106  LAPLACE CORR-          15.39  (seconds)                    DEFLEC96
 AB2106  ELLIP HEIGHT-         -16.20  (meters)                     GPS OBS
 AB2106  GEOID HEIGHT-         -23.65  (meters)                     GEOID96
 AB2106  DYNAMIC HT  -           7.669 (meters)      25.16  (feet)  COMP
 AB2106  MODELED GRAV-     980,713.5   (mgal)                       NAVD 88
 AB2106
 AB2106  HORZ ORDER  -  A
 AB2106  VERT ORDER  -  FIRST     CLASS II
 AB2106  ELLP ORDER  -  THIRD     CLASS II
 AB2106
 AB2106.The horizontal coordinates were established by GPS observations
 AB2106.and adjusted by the National Geodetic Survey in March 1996.
 AB2106
 AB2106.The orthometric height was determined by differential leveling
 AB2106.and adjusted by the National Geodetic Survey in July 1999.
 AB2106.WARNING-GPS observations at this control monument resulted in a GPS
 AB2106.derived orthometric height which differed from the leveled height by
 AB2106.more than one decimeter (0.1 meter).
 AB2106
 AB2106.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AB2106
 AB2106.The Laplace correction was computed from DEFLEC96 derived deflections.
 AB2106
 AB2106.The ellipsoidal height was determined by GPS observations
 AB2106.and is referenced to NAD 83.
 AB2106
 AB2106.The geoid height was determined by GEOID96.
 AB2106
 AB2106.The dynamic height is computed by dividing the NAVD 88
 AB2106.geopotential number by the normal gravity value computed on the
 AB2106.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 AB2106.degrees latitude (G = 980.6199 gals.).
 AB2106
 AB2106.The modeled gravity was interpolated from observed gravity values.
 AB2106
 AB2106;                    North         East     Units   Scale      Converg.
 AB2106;SPC OR N     -   287,959.647 2,233,121.690   MT  1.00005908 -2 27 11.0
 AB2106;UTM  10      - 5,117,435.579   426,022.306   MT  0.99966727 -0 41 32.1
 AB2106
 AB2106|----------------------------------------------------------------------|
 AB2106| PID    Reference Object                     Distance      Geod. Az  |
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AB2106|                                                              dddmmss.s |
AB2106| AB2105 MINE ROOF                              275.238 METERS 09110     |
AB2106| AF9545 FORT STEVENS 1 CORS ARP                284.201 METERS 12832     |
AB2106|-----------------------------------------------------------------------|
AB2106
AB2106                          SUPERSEDED SURVEY CONTROL
AB2106
AB2106  ELLIP HT    -         -16.07  (m)                       GP(       ) 1 1
AB2106
AB2106.Superseded values are not recommended for survey control.
AB2106.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AB2106.See file dsdata.txt to determine how the superseded data were derived.
AB2106
AB2106_MARKER: DS = TRIANGULATION STATION DISK
AB2106_SETTING: 36 = ROOF OF CONCRETE BUNKER
AB2106_STAMPING: SMUR 1994
AB2106_PROJECTION: FLUSH
AB2106_MAGNETIC: O = OTHER; SEE DESCRIPTION
AB2106_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
AB2106_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AB2106+SATELLITE: SATELLITE OBSERVATIONS - September 29, 1998
AB2106
AB2106  HISTORY     - Date     Condition        Recov. By
AB2106  HISTORY     - 1994     MONUMENTED       NGS
AB2106  HISTORY     - 19960711 GOOD             NGS
AB2106  HISTORY     - 19960718 GOOD             NGS
AB2106  HISTORY     - 19970725 GOOD             WADECO
AB2106  HISTORY     - 19980929 GOOD             WADOE
AB2106
AB2106                          STATION DESCRIPTION
AB2106
AB2106'DESCRIBED BY NATIONAL GEODETIC SURVEY 1994 (LLR)
AB2106'THE STATION IS LOCATED ABOUT 0.6 MILENNW OF HAMMOND ON THE GROUNDS OF
AB2106'FORT STEVENS STATE PARK.
AB2106'
AB2106'TO REACH FROM THE FOUR WAY STOP (LAKE DRIVE AND PACIFIC) IN HAMMOND GO
AB2106'WEST ON PACIFIC DRIVE FOR 0.2 MILETO A ROAD FORK, TAKE RIGHT FORK AND
AB2106'GO 0.4 MILETO A FOUR WAY STOP, TURN RIGHT AND GO 0.1 MILETO BATTERY
AB2106'ELIAS SMUR AND STATION ABOUT 35 METERSON THE LEFT.
AB2106'
AB2106'THE STATION IS AN NGS DISK SET INTO A DRILL HOLE IN THE ROOF OF THE
AB2106'BATTERY.  IT IS 10.6 METERSWEST OF CENTER OF ELIAS SMUR SIGN, 6.4
AB2106'METERSSOUTH OF THE NORTH EDGE OF THE BATTERY, AND 1.7 METERSEAST OF
AB2106'THE WEST EDGE OF THE BATTERY.
AB2106'
AB2106'DESCRIBED BY LYLE RIGGERS.
AB2106
AB2106                          STATION RECOVERY (1996)
AB2106
AB2106'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1996 (JGF)
AB2106'RECOVERED AS DESCRIBED.  THE STATION IS ABOUT 4 METERS (13.1 FT) ABOVE
AB2106'THE GROUND ELEVATION BUT CAN BE EASILY LEVELED UP THE CONCRETE
AB2106'STAIRCASE.
AB2106
AB2106                          STATION RECOVERY (1996)
AB2106
AB2106'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1996 (JGF)
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AB2106'THE STATION WAS RECOVERED AS DESCRIBED.
AB2106
AB2106                          STATION RECOVERY (1997)
AB2106
AB2106'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
AB2106'RECOVERED AS DESCRIBED.
AB2106
AB2106                          STATION RECOVERY (1998)
AB2106
AB2106'RECOVERY NOTE BY WA STATE DEPT ECOLOGY 1998 (RCD)
AB2106'RECOVERED AS DESCRIBED.  THE STATION IS LOCATED ON THE GOUNDS OF THE
AB2106'FORT STEVENS MILITARY MUSEUM OVERLOOKING THE COLUMBIA RIVER AND IS 0.6
AB2106'MILES (1.0 KM) NW OF THE TOWN OF HAMMOND
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1 National Geodetic Survey, Retrieval Date = OCTOBER 6, 1999

SD0538 ***

SD0538 DESIGNATION - SNAKE 2
SD0538 PID - SD0538
SD0538 STATE/COUNTY- WA/PACIFIC
SD0538 USGS QUAD - OCEAN PARK (1985)
SD0538
SD0538 *CURRENT SURVEY CONTROL
SD0538 _____
SD0538* NAD 83(1991)- 46 26 12.32178(N) 124 01 14.05070(W) ADJUSTED
SD0538* NAVD 88 - 3.03 (meters) 9.9 (feet) GPS OBS
SD0538 _____
SD0538 X - -2,463,579.311 (meters) COMP
SD0538 Y - -3,649,579.591 (meters) COMP
SD0538 Z - 4,598,823.017 (meters) COMP
SD0538 LAPLACE CORR- 16.50 (seconds) DEFLEC96
SD0538 ELLIP HEIGHT- -21.09 (meters) GPS OBS
SD0538 GEOID HEIGHT- -23.97 (meters) GEOID96
SD0538
SD0538 HORZ ORDER - FIRST
SD0538 ELLP ORDER - THIRD CLASS II
SD0538
SD0538.The horizontal coordinates were established by GPS observations
SD0538.and adjusted by the National Geodetic Survey in January 1999.
SD0538
SD0538.The orthometric height was determined by GPS observations and a
SD0538.high-resolution geoid model using precise GPS observation and
SD0538.processing techniques.
SD0538
SD0538.The X, Y, and Z were computed from the position and the ellipsoidal ht.
SD0538
SD0538.The Laplace correction was computed from DEFLEC96 derived deflections.
SD0538
SD0538.The ellipsoidal height was determined by GPS observations
SD0538.and is referenced to NAD 83.
SD0538
SD0538.The geoid height was determined by GEOID96.
SD0538

		North	East	Units	Scale	Converg.
SD0538;						
SD0538;SPC WA S	-	128,681.474	229,550.786	MT	0.99991793	-2 33 26.4
SD0538;UTM 10	-	5,143,081.934	421,599.216	MT	0.99967555	-0 44 22.4

SD0538

		Primary Azimuth Mark	Grid Az
SD0538:			
SD0538:SPC WA S	-	LIME	178 02 08.2
SD0538:UTM 10	-	LIME	176 13 04.2

SD0538

	PID	Reference Object	Distance	Geod. Az
SD0538				dddmmss.s
SD0538	SC2479	LONG ISLAND SHOAL LIGHT 1939	APPROX.11.0 KM	0172711.5
SD0538		SNAKE 2 RM 2	26.404 METERS	07131
SD0538	SD0551	PETERSONS OYSTER HOUSE CHIMNEY	APPROX. 0.8 KM	0804617.4
SD0538	SD0548	LIME	APPROX. 3.0 KM	1752841.8
SD0538	SD0537	WILLAPA BAY OYSTER CANNERY STK	APPROX. 3.0 KM	1755302.5
SD0538		SNAKE 2 AZ MK 2		2285851.1
SD0538		SNAKE 2 AZ MK		22938
SD0538		SNAKE 2 RM 1	16.983 METERS	24551

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SD0538|        SNAKE 2 RM 3                          14.116 METERS 31642     |
SD0538| SD0541 NAHCOTTA EAGLE OYSTER CO E GAB      APPROX. 7.0 KM 3554119.8 |
SD0538|-----------------------------------------------------------------------|
SD0538
SD0538                          SUPERSEDED SURVEY CONTROL
SD0538
SD0538  NAD 83(1991)-  46 26 12.31892(N)    124 01 14.05060(W) AD(       ) 2
SD0538  NAD 83(1991)-  46 26 12.31846(N)    124 01 14.05012(W) AD(       ) 2
SD0538  NAD 83(1986)-  46 26 12.32029(N)    124 01 14.02937(W) AD(       ) 2
SD0538  NAD 27      -  46 26 12.96166(N)    124 01 09.45254(W) AD(       ) 2
SD0538  NGVD 29     -         2.5    (m)            8.     (f) VERT ANG
SD0538
SD0538.Superseded values are not recommended for survey control.
SD0538.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0538.See file dsdata.txt to determine how the superseded data were derived.
SD0538
SD0538_MARKER: DD = SURVEY DISK
SD0538_SETTING: 2 = OBJECT DRIVEN INTO GROUND
SD0538_STAMPING: SNAKE 2 1938
SD0538_PROJECTION: FLUSH
SD0538_MAGNETIC: P = MARKER IS A STEEL PIPE
SD0538_STABILITY: D = MARK OF QUESTIONABLE OR UNKNOWN STABILITY
SD0538
SD0538  HISTORY     - Date     Condition        Recov. By
SD0538  HISTORY     - 1939     MONUMENTED       CGS
SD0538  HISTORY     - 1953     GOOD             CGS
SD0538  HISTORY     - 1958     GOOD             CGS
SD0538  HISTORY     - 1971     GOOD             NGS
SD0538  HISTORY     - 1977     GOOD             WA-049
SD0538  HISTORY     - 19971015 GOOD             WADECO
SD0538
SD0538                          STATION DESCRIPTION
SD0538
SD0538'DESCRIBED BY COAST AND GEODETIC SURVEY 1939 (WMS)
SD0538'THIS STATION IS ABOUT 4 MILES S OF THE VILLAGE OF NAHCOTTA, ON THE W
SD0538'SHORE OF WILLAPA BAY.  IT IS ON LAND OWNED BY A MR. PETERSON WHO ALSO
SD0538'OWNS EXTENSIVE OYSTER LANDS IN THE VICINITY.  MR. PETERSONS PIER OR
SD0538'ELEVATED BOARDWALK RUNS E FROM HIGH GROUND ABOUT MIDWAY BETWEEN
SD0538'TWO SMALL COTTAGES ON THE EDGE OF THE TIMBER.  THE COTTAGES ARE
SD0538'ABOUT 500 YARDS APART.  THE STATION IS 31.2 METERS S OF THE PIER
SD0538'OR WALK, 188 FEET E OF A 24-INCH FIR TREE WHICH HAS A SMALLER DOUBLE
SD0538'FIR TREE ABOUT 7 FEET W OF IT.
SD0538'
SD0538'SURFACE MARK IS A STANDARD DISK CEMENTED IN THE TOP END OF A 36-INCH
SD0538'SECTION OF 4-INCH CAST-IRON SOIL PIPE WHICH PROJECTS 4 INCHES AND
SD0538'IS STAMPED SNAKE 2 1938.
SD0538'
SD0538'SUBSURFACE MARK IS A STANDARD DISK CEMENTED IN THE TOP END OF A
SD0538'12-INCH SECTION OF 4-INCH CAST-IRON SOIL PIPE PLACED 4 FEET
SD0538'UNDERGROUND AND IS STAMPED SNAKE 2 1938.
SD0538'
SD0538'REFERENCE MARK NO.1 IS A STANDARD REFERENCE DISK CEMENTED IN THE
SD0538'TOP END OF A 30-INCH SECTION OF 4-INCH CAST-IRON SOIL PIPE WHICH
SD0538'PROJECTS 4 INCHES, WSW OF THE STATION AND IS STAMPED SNAKE 2 NO.1
SD0538'1938.
SD0538'
SD0538'REFERENCE MARK NO.2 IS MARKED THE SAME AS NO.1, PROJECTING 4
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SD0538'INCHES, NW OF THE STATION, AND STAMPED SNAKE 2 NO.2 1938.
SD0538'
SD0538'TO REACH THE STATION BY ROAD FROM THE INTERSECTION OF U.S. HIGHWAY
SD0538'101, AND THE NAHCOTTA - OYSTERVILLE GRAVEL ROAD, GO N 8.1 MILES TO A
SD0538'DIM ROAD TO THE E, GO THROUGH A BOARD GATE AND PROCEED 0.1 MILE TO
SD0538'THE BEACH AND THE STATION.
SD0538'
SD0538'HEIGHT OF LIGHT ABOVE STATION MARK 3.3 METERS.
SD0538
SD0538 STATION RECOVERY (1953)
SD0538
SD0538'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1953 (RAG)
SD0538'THE STATION AND REFERENCE MARK NUMBER 1 WERE RECOVERED AS DESCRIBED,
SD0538'IN GOOD CONDITION. REFERENCE MARK NUMBER 2 WAS FOUND TO HAVE BEEN
SD0538'DESTROYED BY WAVE ACTION. A NEW REFERENCE MARK, STAMPED NO 3, WAS
SD0538'ESTABLISHED. AN AZIMUTH MARK WAS ALSO ESTABLISHED. A NEW
SD0538'DESCRIPTION FOLLOWS--
SD0538'
SD0538'THE STATION IS LOCATED ON THE WEST SHORE OF WILLAPA BAY AND LIES
SD0538'ABOUT 4 MILES SOUTH OF THE VILLAGE OF NAHCOTTA, ABOUT 200 FEET EAST
SD0538'OF THE TIMBER AND 30 FEET WEST THE LOW BANK.
SD0538'
SD0538'TO REACH FROM THE LONG BEACH HOTEL IN THE VILLAGE OF LONG BEACH. GO
SD0538'NORTH ON STATE ROUTE 12 A FOR 3.1 MILES. TURN RIGHT AND GO EAST
SD0538'FOR 1.35 MILES TO A T-ROAD INTERSECTION. TURN LEFT AND GO NORTH
SD0538'FOR 2.7 MILES TO THE AZIMUTH MARK ON THE RIGHT HAND SIDE OF THE
SD0538'ROAD. CONTINUE NORTH FOR 0.1 MILE. TURN RIGHT, ONTO A DIM ROAD,
SD0538'AND GO EAST FOR 0.1 MILE TO THE END OF THE POINT AND THE STATION.
SD0538'
SD0538'REFERENCE MARK NUMBER 1 IS A STANDARD DISK, STAMPED SNAKE 2 NO 1
SD0538'1938, SET IN THE TOP OF A 4 INCH CAST IRON SOIL PIPE WHICH PROJECTS
SD0538'4 INCHES AND IS LOCATED AT ABOUT THE SAME ELEVATION AS THE STATION.
SD0538'
SD0538'REFERENCE MARK NUMBER 3 IS A STANDARD DISK, STAMPED SNAKE 2 NO 3
SD0538'1938, SET IN THE TOP OF A 4 INCH CAST IRON SOIL PIPE WHICH PROJECTS
SD0538'4 INCHES AND IS LOCATED AT ABOUT THE SAME ELEVATION AS THE STATION.
SD0538'
SD0538'THE AZIMUTH MARK IS A STANDARD DISK, STAMPED SNAKE 2 1953, SET IN THE
SD0538'TOP OF A SQUARE CONCRETE POST WHICH PROJECTS 8 INCHES. IT IS
SD0538'LOCATED ABOUT 0.15 MILE SOUTHWEST OF THE STATION, 14 FEET EAST OF
SD0538'THE CENTER OF A PAVED ROAD, 3 FEET WEST OF A WIRE FENCE AND 18 INCHES
SD0538'NORTH OF A POWER POLE.
SD0538'
SD0538'OBSERVATIONS WERE MADE FROM A 64 FOOT STEEL TOWER.
SD0538
SD0538 STATION RECOVERY (1958)
SD0538
SD0538'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1958 (VRS)
SD0538'RECOVERED IN GOOD CONDITION ABOUT 4 MILES SOUTH OF NAHCOTTA, ABOUT
SD0538'650 FEET EAST OF SAND RIDGE ROAD, ABOUT 150 FEET NORTHEAST OF A
SD0538'HOUSE, 6 FEET SOUTHWEST OF THE SHORELINE ON THE WEST SHORE OF
SD0538'SHOALWATER BAY, ON A LOW, GRASSY POINT.
SD0538'
SD0538'TO REACH FROM FIRST STREET AND PACIFIC AVENUE NORTH (STATE HIGHWAY
SD0538'12A) IN LONG BEACH, GO NORTH ON STATE HIGHWAY 12A FOR 3.1 MILES,
SD0538'TURN RIGHT (EAST) ONTO A PAVED ROAD, GO 1.35 MILES TO A T-ROAD,
SD0538'TURN LEFT (NORTH) ONTO SAND RIDGE ROAD (PAVED), GO 2.7 MILES TO

SD0538'THE AZIMUTH MARK ON THE RIGHT. CONTINUE NORTH ON SAND RIDGE ROAD
SD0538'FOR 0.1 MILE, TURN RIGHT (EAST) ONTO DIRT ROAD, GO 0.1 MILE TO END OF
SD0538'ROAD. THE STATION IS ABOUT 400 FEET TO THE NORTHEAST.
SD0538'
SD0538'SURFACE MARK IS A STANDARD DISK, STAMPED SNAKE 2 1938, SET IN THE
SD0538'TOP OF A 4-INCH IRON PIPE, PROJECTING 3 INCHES ABOVE THE GROUND.
SD0538'
SD0538'SUBSURFACE MARK WAS NOT SEARCHED FOR.
SD0538'
SD0538'REFERENCE MARK 1 IS A STANDARD DISK, STAMPED SNAKE 2 1938 NO 1,
SD0538'SET IN THE TOP OF A 4-INCH IRON PIPE, FLUSH WITH THE GROUND. IT IS
SD0538'SOUTHWEST OF THE STATION AT ABOUT THE SAME ELEVATION.
SD0538'
SD0538'REFERENCE MARK 3 IS A STANDARD DISK, STAMPED SNAKE 2 1938 NO 3,
SD0538'SET IN THE TOP OF A 4-INCH IRON PIPE, PROJECTING 6 INCHES ABOVE
SD0538'THE GROUND. IT IS NORTHWEST OF THE STATION AT ABOUT THE SAME
SD0538'ELEVATION.
SD0538'
SD0538'SURFACE MARK AND REFERENCE MARKS ARE AWASH AT STORM HIGH WATERS.
SD0538'
SD0538'THE AZIMUTH MARK IS A STANDARD DISK, STAMPED SNAKE 2 1953, SET IN
SD0538'THE TOP OF A 10-INCH SQUARE CONCRETE MONUMENT, PROJECTING 8 INCHES
SD0538'ABOVE THE GROUND. IT IS SOUTHWEST OF THE STATION, ABOUT 1-1/2 FEET
SD0538'NORTH OF A POWER POLE, 3 FEET WEST OF A WIRE FENCE, 14 FEET EAST OF
SD0538'THE CENTERLINE OF SAND RIDGE ROAD.
SD0538
SD0538   STATION RECOVERY (1971)
SD0538
SD0538'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1971 (LFS)
SD0538'THE STATION MARK AND REFERENCE MARKS NO. 1 AND 3 WERE RECOVERED IN
SD0538'GOOD CONDITION. THE POST CONTAINING THE AZIMUTH MARK DISK WAS FOUND
SD0538'LAYING ON TOP OF THE GROUND. THE DISK WAS RESTAMPED AND THE POST AND
SD0538'DISK RESET. A COMPLETE NEW DESCRIPTION FOLLOWS--
SD0538'
SD0538'THE STATION IS ON THE WEST SHORE OF SHOALWATER BAY, ON THE EAST
SD0538'SIDE OF NORTH BEACH PENINSULA, 6-1/2 MILES NORTH OF LONG BEACH, 4
SD0538'1/2 MILES SOUTH OF NAHCOTTA AND ON PROPERTY OWNED BY MR. OLDENBOURG,
SD0538'IN SECTION 15, T 11 N, R 11 W.
SD0538'
SD0538'TO REACH FROM THE NAHCOTTA STORE AND POST OFFICE IN NAHCOTTA, GO
SD0538'SOUTH ON THE BLACKTOP ROAD FOR 0.4 MILE TO THE INTERSECTION OF BAY
SD0538'ROAD AND PENINSULA ROAD, CONTINUE SOUTH ON PENINSULA ROAD FOR 3.9
SD0538'MILES TO MR. J. L. PETERSENS DRIVEWAY ON THE LEFT. (CONTINUE SOUTH
SD0538'0.1 MILE TO THE AZIMUTH MARK). (THIS DRIVEWAY IS 1.6 MILES NORTH OF
SD0538'LITSCHKE ROAD). TURN LEFT AND GO EAST ON MR. PETERSENS DRIVEWAY
SD0538'0.1 MILE TO HOUSE. WALK AROUND NORTH SIDE OF HOUSE AND EAST ABOUT
SD0538'75 YARDS FROM THE NORTHEAST CORNER OF THE HOUSE TO THE STATION,
SD0538'WHICH IS 15 FEET NORTH OF MR. PETERSENS PROPERTY LINE.
SD0538'
SD0538'THE STATION MARK, STAMPED SNAKE 2 1938, IS A STANDARD DISK SET IN A
SD0538'4-INCH SOIL PIPE WHICH PROJECTS 4 INCHES. IT IS ABOUT 100 FEET
SD0538'WEST OF THE EXTREME EAST EDGE OF THE WEEDS AT THE HIGH WATER LINE,
SD0538'76 FEET NORTH OF THE PROJECTED NORTH SIDE OF MR. PETERSENS HOUSE, 5
SD0538'FEET WEST OF THE UPPER EDGE OF THE POINT WHERE THE LAND BREAKS
SD0538'LOWER TOWARD THE WATER AND THIS ENTIRE AREA PROBABLY FLOODS AT
SD0538'EXTREMELY HIGH TIDES.
SD0538'

SD0538'REFERENCE MARK NO. 1, STAMPED SNAKE 2 1938 NO 1, IS A STANDARD DISK
SD0538'SET IN A 4-INCH SOIL PIPE 3 INCHES BELOW GROUND, 58.3 FEET EAST OF
SD0538'THE EAST ONE OF THREE, 5-INCH DIAMETER ORNAMENTAL FIR TREES
SD0538'GROWING 6 FEET APART, 51.1 FEET NORTH OF THE PROJECTED NORTH SIDE OF
SD0538'THE HOUSE (PROJECTED N. SIDE OF HOUSE IS NOT THE GARAGE, WHICH
SD0538'PROTRUDES FARTHER NORTH THAN THE HOUSE), AND 8.5 FEET SOUTH OF THE
SD0538'PROPERTY LINE.
SD0538'
SD0538'REFERENCE MARK NO. 3, STAMPED SNAKE 2 1938 NO 3, IS A STANDARD DISK
SD0538'SET IN A 4-INCH SOIL PIPE WHICH PROJECTS 8 INCHES. IT IS 48.5 FEET
SD0538'NORTH OF THE PROPERTY LINE AND 3 FEET SOUTH OF A 1-FOOT BANK AT THE
SD0538'HIGH WATER LINE.
SD0538'
SD0538'THE AZIMUTH MARK, STAMPED SNAKE 2 1938 1971, IS A STANDARD DISK
SD0538'SET IN A SQUARE CONCRETE POST 105 FEET SSW OF A 30-INCH FIR TREE,
SD0538'104 FEET SOUTH OF A POWER POLE, 18 FEET EAST OF CENTER OF ROAD, 1
SD0538'FT E OF FENCE, 1/2 FT E OF WIT. POST.
SD0538'
SD0538'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN 4-1/2 MILES SOUTH
SD0538'OF NAHCOTTA.
SD0538
SD0538   STATION RECOVERY (1977)
SD0538
SD0538'RECOVERY NOTE BY PACIFIC COUNTY WASHINGTON 1977
SD0538'THE STATION MARK AND REFERENCE MARKS WERE RECOVERED IN GOOD
SD0538'CONDITION. *
SD0538'
SD0538'THE STATION IS LOCATED ON THE WEST SHORE OF WILLAPA BAY AND LIES
SD0538'ABOUT 4 MILES SOUTH OF NAHCOTTA AND ABOUT 200 FEET EAST OF THE
SD0538'TIMBER.
SD0538'
SD0538'TO REACH THE STATION FROM THE INTERSECTION OF SR101 AND PENINSULA
SD0538'HIGHWAY (ALSO KNOWN AS SANDRIDGE ROAD) HEAD NORTH ON PENINSULA
SD0538'HIGHWAY 7.46 MILE TO THE DRIVEWAY OF MR. PETERSENS ON THE RIGHT.
SD0538'TURN RIGHT INTO DRIVEWAY AND PARK BY GARAGE ABOUT 150 YARDS EAST
SD0538'OF PENINSULA HIGHWAY. THE STATION IS LOCATED NE OF THE HOUSE ON THE
SD0538'EDGE OF WILLAPA BAY IN THE TIDAL GRASS.
SD0538'
SD0538'THE STATION MARK STAMPED SNAKE 2 1938 IS A STANDARD DISK SET IN
SD0538'THE TOP OF A 4 INCH SOIL PIPE PROJECTING 6 INCHES ABOVE THE GROUND
SD0538'SURFACE. IT IS 246.2 FEET NORTHEAST OF THE NORTH CORNER OF THE
SD0538'ADDITION ON THE NORTH SIDE OF THE PETERSON HOUSE. A WITNESS POST
SD0538'WAS SET 3 FEET SOUTHEAST OF STATION.
SD0538'
SD0538'REFERENCE MARK NO. 1 STAMPED SNAKE 2 NO. 1 1938, A STANDARD DISK
SD0538'SET IN A 4 INCH PIPE WAS FOUND 4 INCHES BELOW THE SURFACE AND ABOUT
SD0538'3 FEET NORTH OF A 3 FOOT HIGH BANK CAUSED BY EROSION. BRICK WERE
SD0538'PLACED AROUND THE REFERENCE MARK AND A WITNESS POST TO AID IN FUTURE
SD0538'RECOVERY.
SD0538'
SD0538'REFERENCE MARK NO. 3 STAMPED SNAKE 2 NO. 3 1938 A STANDARD DISK
SD0538'SET IN A 4 INCH PIPE PROJECTS 6 INCHES ABOVE THE SURFACE. A
SD0538'WITNESS POST WAS SET TO AID IN FUTURE RECOVERY.
SD0538'
SD0538'AZIMUTH MARK STAMPED SNAKE 2 1953 SET IN CONCRETE WAS FOUND 0.15
SD0538'MILE SOUTHWEST OF THE STATION 14 FEET EAST OF THE CENTER OF THE
SD0538'COUNTY ROAD AND 2 FEET WEST OF THE FENCE LINE. IT IS MARKED BY A

SD0538'WITNESS POST 2 FEET EAST OF MARK. AZIMUTH MARK SIGHT LINE IS
SD0538'BLOCKED BY SHRUBBERY IN THE PETERSON YARD.
SD0538'
SD0538'CHANNEL MARKER DOLFIN NO. 17 IS A CLUSTER OF 4 PILING DRIVEN AT A
SD0538'SLANT WITH ONE CENTER PILING PROJECTING UP TO A PLATFORM WITH A
SD0538'SQUARE PANEL WITH THE NUMBER 17 IN THE CENTER. THE CENTER PILING
SD0538'WAS USED FOR A SIGHT, BEING VERY VISIBLE AT ALL ANGLES. THE DOLFIN
SD0538'IS LOCATED NORTHEAST OF STATION ON THE EAST SIDE OF THE CHANNEL
SD0538'BETWEEN THE PENINSULA AND LONG ISLAND.
SD0538'
SD0538'*THE NEW MEASUREMENTS TO REFERENCE MARK NO 1 IS .02 FOOT SHORTER,
SD0538'REFERENCE MARK NO. 3 IS .03 LONGER AND THE INTERIOR ANGLE BETWEEN
SD0538'REFERENCE MARKS IS 0 DEG 01 MIN 51 SEC LARGER. THE STATION MARK AND
SD0538'REFERENCE MARKS APPEAR NOT TO HAVE BEEN DISTURBED.
SD0538
SD0538   STATION RECOVERY (1997)
SD0538
SD0538'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0538'RECOVERED AS DESCRIBED. STATION AND REFERENCE MARKS RECOVERED. TO
SD0538'REACH THE PETERSON HOME FROM THE INTERSECTION OF US 101 AND SANDRIDGE
SD0538'ROAD PROCEED NORTH 7.46 MILES (12.01 KM) TO THE DRIVEWAY OF THE
SD0538'PETERSON HOME (HOME HAS LARGE WELCOME SIGN IN 2 FT (0.6 M) TALL
SD0538'LETTERS IN GERMAN OVER THE GARAGE) . THE STATION IS AT THE NORTH EDGE
SD0538'OF THE PETERSON PROPERTY AND IS NE OF THE HOUSE IN TIDAL GRASS. THE
SD0538'STEEL WITNESS POSTS FOR THE STATION AND REFERENCE MARKS ARE VISIBLE
SD0538'FROM THE HOUSE.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0132 ***********************************************************************
 SD0132  CBN         -  This is a Cooperative Base Network Control Station.
 SD0132  DESIGNATION -  SOUTH
 SD0132  PID         -  SD0132
 SD0132  STATE/COUNTY-  WA/GRAYS HARBOR
 SD0132  USGS QUAD   -  SHALE SLOUGH (1982)
 SD0132
 SD0132                        *CURRENT SURVEY CONTROL
 SD0132  ______________________________________________________________________
 SD0132* NAD 83(1991)-  47 17 58.39626(N)    124 14 54.90456(W)     ADJUSTED
 SD0132* NAVD 88     -         4.643  (meters)      15.23   (feet)  ADJUSTED
 SD0132  ______________________________________________________________________
 SD0132  X           -  -2,438,691.112 (meters)                     COMP
 SD0132  Y           -  -3,581,887.829 (meters)                     COMP
 SD0132  Z           -   4,664,398.894 (meters)                     COMP
 SD0132  LAPLACE CORR-           7.93  (seconds)                    DEFLEC96
 SD0132  ELLIP HEIGHT-         -19.65  (meters)                     GPS OBS
 SD0132  GEOID HEIGHT-         -24.09  (meters)                     GEOID96
 SD0132  DYNAMIC HT  -           4.643 (meters)      15.23  (feet)  COMP
 SD0132  MODELED GRAV-     980,768.3   (mgal)                       NAVD 88
 SD0132
 SD0132  HORZ ORDER  -  B
 SD0132  VERT ORDER  -  SECOND    CLASS I
 SD0132  ELLP ORDER  -  THIRD     CLASS II
 SD0132
 SD0132.The horizontal coordinates were established by GPS observations
 SD0132.and adjusted by the National Geodetic Survey in May 1991.
 SD0132
 SD0132.The orthometric height was determined by differential leveling
 SD0132.and adjusted by the National Geodetic Survey in June 1991.
 SD0132
 SD0132.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0132
 SD0132.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0132
 SD0132.The ellipsoidal height was determined by GPS observations
 SD0132.and is referenced to NAD 83.
 SD0132
 SD0132.The geoid height was determined by GEOID96.
 SD0132
 SD0132.The dynamic height is computed by dividing the NAVD 88
 SD0132.geopotential number by the normal gravity value computed on the
 SD0132.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 SD0132.degrees latitude (G = 980.6199 gals.).
 SD0132
 SD0132.The modeled gravity was interpolated from observed gravity values.
 SD0132
 SD0132;                    North         East     Units   Scale      Converg.
 SD0132;SPC WA S     -   225,289.989   216,603.875   MT  0.99999245 -2 43 22.6
 SD0132;UTM  10      - 5,239,209.297   405,608.068   MT  0.99970950 -0 55 03.6
 SD0132
 SD0132:                Primary Azimuth Mark                     Grid Az
 SD0132:SPC WA S     -  OUT                                      271 42 55.0
 SD0132:UTM  10      -  OUT                                      269 54 36.0
 SD0132
 SD0132|----------------------------------------------------------------------|
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SD0132| PID    Reference Object                     Distance      Geod. Az  |
SD0132|                                                           dddmmss.s |
SD0132|        SOUTH WM 2                                        12218     |
SD0132| SD0786 OUT                                APPROX. 1.5 KM 2685932.4 |
SD0132| SD0792 IN                                 APPROX. 1.5 KM 2712208.3 |
SD0132|        SOUTH WM 1                                        30115     |
SD0132|-----------------------------------------------------------------|
SD0132
SD0132                          SUPERSEDED SURVEY CONTROL
SD0132
SD0132  ELLIP HT    -         -19.45  (m)                      GP(       ) 4 1
SD0132  NAD 83(1986)-  47 17 58.38487(N)    124 14 54.91274(W) AD(       ) 3
SD0132  NAD 27      -  47 17 59.08400(N)    124 14 50.25600(W) AD(       ) 3
SD0132  NGVD 29     -         3.622  (m)           11.88   (f) ADJ UNCH    2 1
SD0132
SD0132.Superseded values are not recommended for survey control.
SD0132.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0132.See file dsdata.txt to determine how the superseded data were derived.
SD0132
SD0132_MARKER: DS = TRIANGULATION STATION DISK
SD0132_SETTING: 80 = SET IN A BOULDER
SD0132_STAMPING: SOUTH XXVII
SD0132_PROJECTION: FLUSH
SD0132_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0132_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0132+STABILITY: SURFACE MOTION
SD0132_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SD0132+SATELLITE: SATELLITE OBSERVATIONS - February 15, 1991
SD0132
SD0132  HISTORY     - Date     Condition        Recov. By
SD0132  HISTORY     - 1927     MONUMENTED       CGS
SD0132  HISTORY     - 1951     MONUMENTED       CGS
SD0132  HISTORY     - 1962     MONUMENTED       CGS
SD0132  HISTORY     - 1969     MONUMENTED       CGS
SD0132  HISTORY     - 1977     GOOD             NGS
SD0132  HISTORY     - 1986     GOOD             NGS
SD0132  HISTORY     - 19870606 GOOD
SD0132  HISTORY     - 19891017 GOOD             NGS
SD0132  HISTORY     - 19910215 GOOD
SD0132  HISTORY     - 19970721 GOOD             WADECO
SD0132
SD0132                          STATION DESCRIPTION
SD0132
SD0132'DESCRIBED BY COAST AND GEODETIC SURVEY 1927 (TJM)
SD0132'THE STATION IS IN GRANVILLE BAY, ONE MILE N OF WRECK CREEK, ON AN
SD0132'ISOLATED ROCK, 12 FEET HIGH, 49 FEET IN DIAMETER, 18.5 METERS
SD0132'OUTSIDE OF HIGH-WATER LINE, 155 FEET FROM A SMALL STREAM.  A SPUR
SD0132'ROAD RUNS FROM THE MAIN ROAD TO THE BEACH AT THIS POINT.  THE
SD0132'STANDARD DISK IS STAMPED SOUTH XXVII.
SD0132'
SD0132'STATION IS MARKED BY A STANDARD BRONZE DISK WEDGED IN A DRILL HOLE
SD0132'IN OUTCROPPING BEDROCK, AS DESCRIBED IN NOTE 2.
SD0132'
SD0132'WITNESS MARK NO.1 IS THE TOP OF A COLUMNAR ROCK 16 FEET HIGH.
SD0132'WITNESS MARK NO.2 IS THE W SIDE OF A COLUMNAR ROCK, 20 FEET HIGH
SD0132'ALONG SIDE THE ROAD OUTLET TO THE BEACH.
SD0132'
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SD0132'HEIGHT OF SIGNAL ABOVE STATION MARK - 8 METERS.
SD0132
SD0132 STATION RECOVERY (1951)
SD0132
SD0132'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1951 (CWC)
SD0132'RECOVERED.
SD0132'
SD0132'ABOUT 1-1/2 MILES SOUTHEAST OF POINT GRENVILLE, 1.2 MILES
SD0132'NORTH-NORTHWEST OF WRECK CREEK, ON AN ISOLATED ROCK, 12 FEET HIGH,
SD0132'AND 49 FEET IN DIAMETER, 30 METERS WEST, OFFSHORE, OF THE HIGH WATER
SD0132'LINE, ABOUT 170 METERS NORTHWEST OF ROAD LEADING TO BEACH, 75
SD0132'METERS NORTH OF SMALL STREAM, 47 METERS NORTHWEST OF THE WEST SIDE
SD0132'OF A COLUMNAR ROCK 20 FEET HIGH, 45 METERS WEST OF THE BASE OF THE
SD0132'BLUFF, AND 7 METERS SOUTH OF SMALL STREAM. IT IS MARKED BY A
SD0132'STANDARD TRIANGULATION DISC CEMENTED IN DRILL HOLE AND STAMPED
SD0132'SOUTH, XXVII.
SD0132
SD0132 STATION RECOVERY (1962)
SD0132
SD0132'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1962 (MEW)
SD0132'THE STATION WAS RECOVERED IN GOOD CONDITION, ALTHO THE MARK DOES
SD0132'PROJECT ABOUT A QUARTER OF AN INCH ABOVE THE ROCK AT THE PRESENT
SD0132'TIME. THE TOP OF THE ROCK IS ABOUT 12 FEET IN DIAMETER AND THE
SD0132'ROCK PROJECTS ABOUT 10 FEET. ADDITIONAL INFORMATION FOLLOWS--
SD0132'
SD0132'TO REACH FROM THE POST OFFICE IN PACIFIC BEACH, GO EAST ON THE MAIN
SD0132'STREET FOR 0.15 MILE TO A CROSSROAD, (STATE HIGHWAY 9C), TURN LEFT
SD0132'AND GO NORTH ON STATE HIGHWAY 9C TO A Y INTERSECTION AND THE MOCLIPS
SD0132'POST OFFICE ON THE LEFT, TAKE LEFT FORK AND GO 0.25 MILE TO A
SD0132'T-INTERSECTION, TURN RIGHT AND FOLLOW STATE HIGHWAY 9C EAST, THEN
SD0132'NORTH FOR 4.7 MILES TO A SIDE ROAD LEFT, WHICH RUNS ABOUT 100 FEET TO
SD0132'THE BEACH. THIS SIDE ROAD IS 1.3 MILES SOUTH OF THE ROAD INTO THE
SD0132'COAST GUARD STATION. FROM THE POINT WHERE THE ROAD ENTERS THE BEACH
SD0132'THE STATION IS ABOUT 190 YARDS TO THE NORTH. 42 YARDS NORTH OF THE
SD0132'ROAD ONTO THE BEACH IS A ROCK 8 FEET HIGH, 58 YARDS BEYOND THIS IS
SD0132'A SMALL STREAM, 43 YARDS BEYOND THIS THERE IS A ROCK 20 FEET HIGH,
SD0132'37 YARDS BEYOND THIS IS A SECOND SMALL STREAM AND ABOUT 10 YARDS
SD0132'BEYOND THE STREAM IS THE ROCK ABOUT 10 FEET HIGH WITH THE MARK IN
SD0132'THE APPROXIMATE CENTER OF THE TOP. THIS ROCK IS ABOUT 2 FEET
SD0132'HOGHER ON THE NORTH SIDE THAN ON THE SOUTH SIDE AND IT IS ABOUT 75
SD0132'FEET SOUTH OF A ROCK OUTCROP WHICH IS ABOUT 50 FEET LONG BY 35 FEET
SD0132'WIDE AND PROJECTS AN AVERAGE OF 4 FEET. THE STATION AND ALL ROCKS
SD0132'MENTIONED ARE ON THE OCEAN SIDE OF THE HIGH WATER LINE, BUT ARE NOT
SD0132'ORDINARILY IN THE WATER. NO OBSERVATIONS WERE MADE FROM THE STATION
SD0132'DURING THIS RECOVERY.
SD0132
SD0132 STATION RECOVERY (1969)
SD0132
SD0132'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1969 (JBW)
SD0132'THE STATION WAS RECOVERED IN GOOD CONDITION.
SD0132'
SD0132'THE STATION IS IN GRENVILLE BAY, 1.0 MILE NORTH OF WRECK CREEK, ON
SD0132'ISOLATED ROCK 7 FEET HIGH AND 12 FEET IN DIAMETER.
SD0132'
SD0132'TO REACH THE STATION FROM THE POST OFFICE IN PACIFIC BEACH, GO EAST
SD0132'ON MAIN STREET TO THE JUNCTION OF MAIN STREET AND WASHINGTON STATE
SD0132'HIGHWAY NO. 109. TURN LEFT ONTO STATE HIGHWAY NO. 109 AND GO NORTH

SD0132'FOR 7.2 MILES TO A POINT WHERE A SIDE ROAD ENTERS ON THE LEFT OF THE
SD0132'HIGHWAY, AND RUNS ABOUT 100 YARDS TO THE BEACH. THIS SIDE ROAD IS
SD0132'1.3 MILES SOUTH OF THE ROAD LEADING TO THE U.S. COAST GUARD STATION.
SD0132'FROM THE POINT WHERE THE ROAD ENTERS THE BEACH, THE STATION IS
SD0132'ABOUT 190 YARDS TO THE NORTH. FORTY TWO YARDS NORTH OF THE ROAD
SD0132'ONTO THE BEACH IS A ROCK 8 FEET HIGH. 58 YARDS BEYOND THE ROCK IS A
SD0132'SMALL STREAM. 43 YARDS BEYOND THE STREAM THERE IS A ROCK 20 FEET
SD0132'HIGH. 37 YARDS BEYOND THIS IS A SECOND SMALL STREAM. AND ABOUT 10
SD0132'YARDS BEYOND THE SECOND STREAM IS A ROCK ABOUT 7 FEET HIGH, WITH THE
SD0132'MARK IN THE APPROXIMATE CENTER OF THE TOP OF THE ROCK. THIS ROCK IS
SD0132'ABOUT 2 FEET HIGHER ON THE NORTH SIDE THAN ON THE SOUTH SIDE, AND
SD0132'IT IS ABOUT 75 FEET SOUTH OF A ROCK OUTCROP WHICH IS ABOUT 50 FEET
SD0132'LONG BY 35 FEET WIDE AND PROJECTS AN AVERAGE OF 4 FEET.
SD0132'
SD0132'THE STATION IS MARKED BY A STANDARD USC AND GS TRIANGULATION DISK
SD0132'SET IN A DRILL HOLE AND IS STAMPED, SOUTH XXVII.
SD0132'
SD0132'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN 3.6 MILES NORTH OF
SD0132'MOCLIPS.
SD0132
SD0132   STATION RECOVERY (1977)
SD0132
SD0132'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1977
SD0132'5.3 MI NORTH FROM MOCLIPS.
SD0132'5.25 MILES NORTH ALONG STATE HIGHWAY 109 FROM THE POST OFFICE AT
SD0132'MOCLIPS, THENCE 0.1 MI NORTH ALONG THE BEACH, ALONG THE NORTH EDGE
SD0132'OF A SMALL STREAM AND IN THE TOP OF A 12 BY 17 FT BOULDER THAT
SD0132'PROJECTS 7 FT.
SD0132
SD0132   STATION RECOVERY (1986)
SD0132
SD0132'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1986 (DAW)
SD0132'THE STATION WAS RECOVERED AT THIS DATE.
SD0132'THE STATION MARK WAS RECOVERED IN GOOD CONDITION IT IS ALSO A BENCH
SD0132'MARK. A NEW DESCRIPTION FOLLOWS.
SD0132'
SD0132'THE STATION IS LOCATED ABOUT 6.4 KM (4 MI) NORTH OF MOPCLIPS, 3.2
SD0132'3.2 KM (2 MI) SOUTH OF PT GRENVILLE, 1.6.KM (1 MI) NORTH OF WRECK
SD0132'CREEKAND ON AN ISLATED BOULDER ABOUT 7 FT IN HEIGHT ON THE BEACH.
SD0132'
SD0132'TO REACH THE STATION FROM THE POST OFFICE IN PACIFIC BEACH GO EAST
SD0132'ON MAIN STREET FOR 0.24 KM (0.15 MI) TO THE JUNCTION OF STATE
SD0132'HIGHWAY 109. TURN LEFT AND GO NORTH ON STATE HIGHWAY 109 FOR
SD0132'11.59 KM (7.2 MI) TO A SIDE ROAD LEFT. TURN LEFT ONTO THE BEACH
SD0132'THENCE RIGHT NORTHERLY UP THE BEACH FOR ABOUT 190 M (623 FT) TO A
SD0132'LARGE 7 FT HIGH BOULDER AND THE STATION.
SD0132'
SD0132'THE STATION MARK IS A STANDARD C+GS DISK STAMPED---SOUTH XXVII---
SD0132'SET IN A DRILL HOLE IN A BOULDER THAT IS EXPOSED 3.7 M (12 FT). IT
SD0132'IS ON THE NORTHEDGE OF A SMALL STREAM.
SD0132'
SD0132'THIS STATION IS SUITEABLE FOR GPS OBSERVATIONS.
SD0132'
SD0132'DESCRIBED BY DA WEGENAST.
SD0132
SD0132   STATION RECOVERY (1987)
SD0132

SD0132'RECOVERED 1987
SD0132'RECOVERED IN GOOD CONDITION.
SD0132
SD0132 STATION RECOVERY (1989)
SD0132
SD0132'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1989
SD0132'THE STATION IS LOCATED ABOUT 6.4 KM (4.0 MI) NORTH OF MOCLIPS, 3.2 KM
SD0132'(2.0 MI) SOUTH OF POINT GRENVILLE, 1.5 KM (0.9 MI) NORTH OF WRECK
SD0132'CREEK AND ON AN ISOLATED BOULDER ABOUT 2.6 M (8.5 FT) IN HEIGHT ON
SD0132'THE BEACH.
SD0132'TO REACH FROM THE POST OFFICE IN PACIFIC BEACH, GO EAST ON MAIN STREET
SD0132'FOR 0.24 KM (0.15 MI) TO THE JUNCTION OF STATE ROUTE 109. TURN LEFT
SD0132'AND GO NORTH ON STATE ROUTE 109 FOR 11.59 KM (7.20 MI) TO A SIDE ROAD
SD0132'LEFT. TURN LEFT ONTO THE BEACH, THENCE RIGHT NORTHERLY ON THE BEACH
SD0132'FOR ABOUT 190 M (623.4 FT) TO A LARGE 2.6 M (8.5 FT) HIGH BOULDER AND
SD0132'THE STATION.
SD0132'THE MARK IS SET IN A DRILL HOLE IN A BOULDER THAT PROJECTS 2.6 M
SD0132'(8.5 FT) . IT IS ON THE NORTH EDGE OF A SMALL STREAM.
SD0132
SD0132 STATION RECOVERY (1991)
SD0132
SD0132'RECOVERED 1991
SD0132'RECOVERED IN GOOD CONDITION.
SD0132
SD0132 STATION RECOVERY (1997)
SD0132
SD0132'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0132'RECOVERED AS DESCRIBED.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SC2806 ***********************************************************************
 SC2806  CBN         -  This is a Cooperative Base Network Control Station.
 SC2806  DESIGNATION -  SOUTH BEND
 SC2806  PID         -  SC2806
 SC2806  STATE/COUNTY-  WA/PACIFIC
 SC2806  USGS QUAD   -  SOUTH BEND (1985)
 SC2806
 SC2806                         *CURRENT SURVEY CONTROL
 SC2806  ______________________________________________________________________
 SC2806* NAD 83(1991)-  46 39 46.85272(N)    123 48 36.30219(W)     ADJUSTED
 SC2806* NAVD 88     -        25.193  (meters)      82.65   (feet)  ADJUSTED
 SC2806  ______________________________________________________________________
 SC2806  X           -  -2,440,004.188 (meters)                     COMP
 SC2806  Y           -  -3,643,447.433 (meters)                     COMP
 SC2806  Z           -   4,616,137.212 (meters)                     COMP
 SC2806  LAPLACE CORR-          14.88  (seconds)                    DEFLEC96
 SC2806  ELLIP HEIGHT-           2.42  (meters)                     GPS OBS
 SC2806  GEOID HEIGHT-         -22.66  (meters)                     GEOID96
 SC2806  DYNAMIC HT  -          25.198 (meters)      82.67  (feet)  COMP
 SC2806  MODELED GRAV-     980,785.4   (mgal)                       NAVD 88
 SC2806
 SC2806  HORZ ORDER  -  B
 SC2806  VERT ORDER  -  SECOND    CLASS II
 SC2806  ELLP ORDER  -  THIRD     CLASS II
 SC2806
 SC2806.The horizontal coordinates were established by GPS observations
 SC2806.and adjusted by the National Geodetic Survey in May 1991.
 SC2806
 SC2806.The orthometric height was determined by differential leveling
 SC2806.and adjusted by the National Geodetic Survey in April 1995.
 SC2806
 SC2806.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SC2806
 SC2806.The Laplace correction was computed from DEFLEC96 derived deflections.
 SC2806
 SC2806.The ellipsoidal height was determined by GPS observations
 SC2806.and is referenced to NAD 83.
 SC2806
 SC2806.The geoid height was determined by GEOID96.
 SC2806
 SC2806.The dynamic height is computed by dividing the NAVD 88
 SC2806.geopotential number by the normal gravity value computed on the
 SC2806.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 SC2806.degrees latitude (G = 980.6199 gals.).
 SC2806
 SC2806.The modeled gravity was interpolated from observed gravity values.
 SC2806
 SC2806;                    North         East     Units   Scale      Converg.
 SC2806;SPC WA S     -   153,108.434   246,765.530   MT  0.99991552 -2 24 16.0
 SC2806;UTM  10      - 5,168,035.916   438,026.869   MT  0.99964721 -0 35 21.2
 SC2806
 SC2806                           SUPERSEDED SURVEY CONTROL
 SC2806
 SC2806  ELLIP HT    -           2.57  (m)                      GP(       ) 4 1
 SC2806  NGVD 29     -        24.16   (m)           79.3    (f) LEVELING    3
 SC2806
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SC2806.Superseded values are not recommended for survey control.
SC2806.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SC2806.See file dsdata.txt to determine how the superseded data were derived.
SC2806
SC2806_MARKER: DH = HORIZONTAL CONTROL DISK
SC2806_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
SC2806_STAMPING: SOUTH BEND 1990
SC2806_PROJECTION: FLUSH
SC2806_MAGNETIC: O = OTHER; SEE DESCRIPTION
SC2806_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SC2806+STABILITY: SURFACE MOTION
SC2806_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SC2806+SATELLITE: SATELLITE OBSERVATIONS - February 08, 1991
SC2806
SC2806  HISTORY     - Date     Condition        Recov. By
SC2806  HISTORY     - 1990     MONUMENTED       NGS
SC2806  HISTORY     - 19910208 GOOD
SC2806  HISTORY     - 19970723 GOOD             WADECO
SC2806
SC2806                          STATION DESCRIPTION
SC2806
SC2806'DESCRIBED BY NATIONAL GEODETIC SURVEY 1990
SC2806'THE STATION IS LOCATED ABOUT 43.5 KM (27.0 MI) WEST OF DOTY, 35.4 KM
SC2806'(22.0 MI) SOUTHEAST OF WESTPORT, 27.4 KM (17.0 MI) NORTHEAST OF OCEAN
SC2806'PARK AND AT SOUTH BEND ON COUNTY PROPERTY.
SC2806'TO REACH FROM THE JUNCTION OF US HIGHWAY 101 AND MEMORIAL AVENUE IN
SC2806'SOUTH BEND, GO SOUTH ON MEMORIAL AVENUE FOR 0.32 KM (0.20 MI) TO THE
SC2806'COURTHOUSE AND THE STATION.
SC2806'THE MARK IS SET IN THE TOP OF A ROUND CONCRETE MONUMENT THAT IS FLUSH
SC2806'WITH THE SURFACE OF THE LAWN.  IT IS 44 M (144.4 FT) NORTH OF THE
SC2806'BOTTOM STEP OF THE COURTHOUSE, 30.0 M (98.4 FT) SOUTH OF THE NORTH
SC2806'END OF THE SIDEWALK LEADING TO THE COURTHOUSE, 19.9 M (65.3 FT) WEST
SC2806'OF THE WEST CURB, 18.7 M (61.4 FT) SOUTHWEST OF A SIGN, PACIFIC
SC2806'COUNTY COURTHOUSE AND 0.8 M (2.6 FT) EAST OF THE EAST EDGE OF THE
SC2806'SIDEWALK.
SC2806
SC2806                          STATION RECOVERY (1991)
SC2806
SC2806'RECOVERED 1991
SC2806'RECOVERED IN GOOD CONDITION.
SC2806
SC2806                          STATION RECOVERY (1997)
SC2806
SC2806'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SC2806'RECOVERED AS DESCRIBED.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7007 ***********************************************************************
 AH7007  DESIGNATION -  SPICE
 AH7007  PID         -  AH7007
 AH7007  STATE/COUNTY-  WA/GRAYS HARBOR
 AH7007  USGS QUAD   -  WESTPORT (1984)
 AH7007
 AH7007                         *CURRENT SURVEY CONTROL
 AH7007  ______________________________________________________________________
 AH7007* NAD 83(1991)-  46 52 33.67120(N)    124 07 15.14277(W)     ADJUSTED
 AH7007* NAVD 88     -        10.93   (meters)      35.9    (feet)  GPS OBS
 AH7007  ______________________________________________________________________
 AH7007  X           -  -2,450,047.464 (meters)                     COMP
 AH7007  Y           -  -3,615,866.825 (meters)                     COMP
 AH7007  Z           -   4,632,344.057 (meters)                     COMP
 AH7007  LAPLACE CORR-          12.61  (seconds)                    DEFLEC96
 AH7007  ELLIP HEIGHT-         -13.65  (meters)                     GPS OBS
 AH7007  GEOID HEIGHT-         -24.42  (meters)                     GEOID96
 AH7007
 AH7007  HORZ ORDER  -  FIRST
 AH7007  ELLP ORDER  -  THIRD     CLASS II
 AH7007
 AH7007.The horizontal coordinates were established by GPS observations
 AH7007.and adjusted by the National Geodetic Survey in January 1999.
 AH7007
 AH7007.The orthometric height was determined by GPS observations and a
 AH7007.high-resolution geoid model using precise GPS observation and
 AH7007.processing techniques.
 AH7007
 AH7007.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7007
 AH7007.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7007
 AH7007.The ellipsoidal height was determined by GPS observations
 AH7007.and is referenced to NAD 83.
 AH7007
 AH7007.The geoid height was determined by GEOID96.
 AH7007
 AH7007;                    North         East     Units   Scale      Converg.
 AH7007;SPC WA S     -   177,805.208   224,091.455   MT  0.99992747 -2 37 48.7
 AH7007;UTM  10      - 5,191,996.601   414,588.415   MT  0.99968966 -0 49 05.3
 AH7007
 AH7007                           SUPERSEDED SURVEY CONTROL
 AH7007
 AH7007.No superseded survey control is available for this station.
 AH7007
 AH7007_MARKER: DD = SURVEY DISK
 AH7007_SETTING: 4 = OBJECT SURROUNDED BY MASS OF CONCRETE
 AH7007_STAMPING: SPICE 1988
 AH7007_PROJECTION: FLUSH
 AH7007_MAGNETIC: O = OTHER; SEE DESCRIPTION
 AH7007_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AH7007+STABILITY: SURFACE MOTION
 AH7007_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7007+SATELLITE: SATELLITE OBSERVATIONS - 1988
 AH7007
 AH7007  HISTORY     - Date     Condition        Recov. By
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AH7007 HISTORY   - 1988   MONUMENTED   USE
AH7007
AH7007   STATION DESCRIPTION
AH7007
AH7007'DESCRIBED BY US ENGINEERS 1988
AH7007'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .
AH7007'THE STATION IS LOCATED IN THE CITY OF WESTPORT. FROM THE INTERSECTION
AH7007'OF SR 105 AND SR 105 SPUR FOLLOW 105 SPUR NORTH TO NEWELL AVENUE.
AH7007'TURN LEFT (WEST) AND FOLLOW NEWELL AVENUE TO SURF STREET. TURN RIGHT
AH7007'(NORTH) AND FOLLOW SURF STREET ABOUT 100 M (328.1 FT) TO DUNEHAVEN
AH7007'ROAD ON LEFT. FOLLOW DUNEHAVEN ROAD WEST TO DUNE CREST DRIVE. TURN
AH7007'SOUTH ONTO DUNE CREST AND CONTINUE SOUTH TO END OF ROAD AND STATION.
AH7007'THE STATION IS 14.5 M (47.6 FT) SOUTH OF THE END OF THE ROAD, 0.5 M
AH7007'(1.6 FT) SOUTH OF A METAL POST AND A PLASTIC WITNESS POST, OR 14.7 M
AH7007'(48.2 FT) (206 DEGREES GRID) FROM THE SOUTHWEST CORNER OF THE FRONT
AH7007'DECK OF THE BLUE HOUSE AT 1112 DUNE CREST DRIVE. THE STATION IS A COE
AH7007'BRASS DISK IN A IRREGULAR MASS OF CONCRETE. THE DISK IS STAMPED SPICE
AH7007'1988.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0287 ***********************************************************************
 SD0287  DESIGNATION -  TURN RM 4
 SD0287  PID         -  SD0287
 SD0287  STATE/COUNTY-  WA/PACIFIC
 SD0287  USGS QUAD   -  CAPE DISAPPOINTMENT (1985)
 SD0287
 SD0287                         *CURRENT SURVEY CONTROL
 SD0287  ______________________________________________________________________
 SD0287* NAD 83(1991)-  46 19 26.20347(N)    124 02 52.02712(W)     ADJUSTED
 SD0287* NAVD 88     -         5.358  (meters)      17.58   (feet)  ADJUSTED
 SD0287  ______________________________________________________________________
 SD0287  X           -  -2,470,396.087 (meters)                     COMP
 SD0287  Y           -  -3,655,932.018 (meters)                     COMP
 SD0287  Z           -   4,590,173.758 (meters)                     COMP
 SD0287  LAPLACE CORR-          14.53  (seconds)                    DEFLEC96
 SD0287  ELLIP HEIGHT-         -18.91  (meters)                     GPS OBS
 SD0287  GEOID HEIGHT-         -24.11  (meters)                     GEOID96
 SD0287  DYNAMIC HT  -           5.358 (meters)      17.58  (feet)  COMP
 SD0287  MODELED GRAV-     980,707.6   (mgal)                       NAVD 88
 SD0287
 SD0287  HORZ ORDER  -  FIRST
 SD0287  VERT ORDER  -  FIRST     CLASS II
 SD0287  ELLP ORDER  -  THIRD     CLASS II
 SD0287
 SD0287.The horizontal coordinates were established by GPS observations
 SD0287.and adjusted by the National Geodetic Survey in January 1999.
 SD0287
 SD0287.The orthometric height was determined by differential leveling
 SD0287.and adjusted by the National Geodetic Survey in June 1991.
 SD0287
 SD0287.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0287
 SD0287.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0287
 SD0287.The ellipsoidal height was determined by GPS observations
 SD0287.and is referenced to NAD 83.
 SD0287
 SD0287.The geoid height was determined by GEOID96.
 SD0287
 SD0287.The dynamic height is computed by dividing the NAVD 88
 SD0287.geopotential number by the normal gravity value computed on the
 SD0287.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 SD0287.degrees latitude (G = 980.6199 gals.).
 SD0287
 SD0287.The modeled gravity was interpolated from observed gravity values.
 SD0287
 SD0287;                    North         East     Units   Scale      Converg.
 SD0287;SPC WA S     -   116,248.932   226,897.696   MT  0.99992493 -2 34 37.5
 SD0287;UTM  10      - 5,130,574.506   419,342.538   MT  0.99967997 -0 45 28.3
 SD0287
 SD0287                           SUPERSEDED SURVEY CONTROL
 SD0287
 SD0287.No superseded survey control is available for this station.
 SD0287
 SD0287_MARKER: DR = REFERENCE MARK DISK
 SD0287_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
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SD0287_STAMPING: TURN 1926 NO 4
SD0287_PROJECTION: FLUSH
SD0287_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0287_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SD0287+STABILITY: SURFACE MOTION
SD0287
SD0287 HISTORY   - Date   Condition   Recov. By
SD0287 HISTORY   - 1926   MONUMENTED   CGS
SD0287 HISTORY   - 1987   GOOD   NGS
SD0287 HISTORY   - 19971203 GOOD   WADECO
SD0287
SD0287   STATION DESCRIPTION
SD0287
SD0287'DESCRIBED BY NATIONAL GEODETIC SURVEY 1987
SD0287'1.7 KM (1.05 MI) SE FROM SEAVIEW.
SD0287'0.08 KM (0.05 MI) SOUTH ALONG STATE HIGHWAY 103 FROM THE POST OFFICE
SD0287'IN SEAVIEW, THENCE 0.81 KM (0.50 MI) EAST ALONG US HIGHWAY 101,
SD0287'THENCE 0.81 KM (0.50 MI) SOUTH ALONG OLD HIGHWAY 101, 5.8 M (19.0 FT)
SD0287'NORTH OF THE CENTERLINE OF 30TH STREET WEST (HOLMAN ROAD), 19.7 M
SD0287'(64.6 FT) WEST OF THE CENTERLINE OF THE OLD HIGHWAY.
SD0287'THE MARK IS 0.30 METERS E FROM A WITNESS POST
SD0287'THE MARK IS ABOVE LEVEL WITH 30TH STREET.
SD0287
SD0287   STATION RECOVERY (1997)
SD0287
SD0287'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0287'RECOVERED AS DESCRIBED. STATION IS NEAR THE NORTHWEST CORNER OF
SD0287'SANDRIDGE ROAD AND 30TH STREET IN THE TOWN OF SEAVIEW. STATION IS IN
SD0287'A OLD GRASS COVERED FLOWER BED AT THE ALAN COURT RV PARK.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SC0554 ***********************************************************************
 SC0554  DESIGNATION -  UU 282
 SC0554  PID         -  SC0554
 SC0554  STATE/COUNTY-  OR/CLATSOP
 SC0554  USGS QUAD   -  WARRENTON (1985)
 SC0554
 SC0554                         *CURRENT SURVEY CONTROL
 SC0554  ______________________________________________________________________
 SC0554* NAD 83(1991)-  46 08 34.47242(N)    123 52 30.13848(W)     ADJUSTED
 SC0554* NAVD 88     -         4.579  (meters)      15.02   (feet)  ADJUSTED
 SC0554  ______________________________________________________________________
 SC0554  X           -  -2,467,462.310 (meters)                     COMP
 SC0554  Y           -  -3,675,429.170 (meters)                     COMP
 SC0554  Z           -   4,576,254.182 (meters)                     COMP
 SC0554  LAPLACE CORR-          14.11  (seconds)                    DEFLEC96
 SC0554  ELLIP HEIGHT-         -18.80  (meters)                     GPS OBS
 SC0554  GEOID HEIGHT-         -23.11  (meters)                     GEOID96
 SC0554  DYNAMIC HT  -           4.580 (meters)      15.03  (feet)  COMP
 SC0554  MODELED GRAV-     980,709.0   (mgal)                       NAVD 88
 SC0554
 SC0554  HORZ ORDER  -  FIRST
 SC0554  VERT ORDER  -  FIRST     CLASS II
 SC0554  ELLP ORDER  -  THIRD     CLASS II
 SC0554
 SC0554.The horizontal coordinates were established by GPS observations
 SC0554.and adjusted by the National Geodetic Survey in January 1999.
 SC0554
 SC0554.The orthometric height was determined by differential leveling
 SC0554.and adjusted by the National Geodetic Survey in June 1991.
 SC0554
 SC0554.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SC0554
 SC0554.The Laplace correction was computed from DEFLEC96 derived deflections.
 SC0554
 SC0554.The ellipsoidal height was determined by GPS observations
 SC0554.and is referenced to NAD 83.
 SC0554
 SC0554.The geoid height was determined by GEOID96.
 SC0554
 SC0554.The dynamic height is computed by dividing the NAVD 88
 SC0554.geopotential number by the normal gravity value computed on the
 SC0554.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 SC0554.degrees latitude (G = 980.6199 gals.).
 SC0554
 SC0554.The modeled gravity was interpolated from observed gravity values.
 SC0554
 SC0554;                    North         East     Units   Scale      Converg.
 SC0554;SPC OR N     -   280,625.959 2,239,297.825   MT  1.00003949 -2 23 36.7
 SC0554;UTM  10      - 5,110,297.994   432,418.497   MT  0.99965614 -0 37 51.6
 SC0554
 SC0554                           SUPERSEDED SURVEY CONTROL
 SC0554
 SC0554  NAD 83(1991)-  46 08 34.47384(N)    123 52 30.13787(W) AD(       ) B
 SC0554  ELLIP HT    -         -18.81  (m)                       GP(       ) 3 1
 SC0554  NGVD 29     -         3.50   (m)           11.5    (f) RESET       3
 SC0554
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SC0554.Superseded values are not recommended for survey control.
SC0554.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SC0554.See file dsdata.txt to determine how the superseded data were derived.
SC0554
SC0554_MARKER: DD = SURVEY DISK
SC0554_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
SC0554_STAMPING: UU 282 1945
SC0554_PROJECTION: FLUSH
SC0554_MAGNETIC: O = OTHER; SEE DESCRIPTION
SC0554_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
SC0554+STABILITY: SURFACE MOTION
SC0554_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SC0554+SATELLITE: SATELLITE OBSERVATIONS - July 15, 1996
SC0554
SC0554  HISTORY     - Date     Condition        Recov. By
SC0554  HISTORY     - 1945     MONUMENTED       ORHD
SC0554  HISTORY     - 1965     GOOD             NGS
SC0554  HISTORY     - 1984     GOOD             USPSQD
SC0554  HISTORY     - 1987     GOOD             USPSQD
SC0554  HISTORY     - 1987     GOOD             NGS
SC0554  HISTORY     - 1989     GOOD             USPSQD
SC0554  HISTORY     - 19960715 GOOD             NGS
SC0554  HISTORY     - 19961107 GOOD             CHANCE
SC0554  HISTORY     - 19970725 GOOD             WADECO
SC0554
SC0554                          STATION DESCRIPTION
SC0554
SC0554'DESCRIBED BY NATIONAL GEODETIC SURVEY 1965
SC0554'6.5 MI S FROM ASTORIA.
SC0554'6.5 MILES SOUTH ALONG ALTERNATE U.S. HIGHWAY 101 FROM THE ASTORIA POST
SC0554'OFFICE, IN THE SOUTHWEST ANGLE FORMED BY A CROSSROAD, 42 FEET SOUTH OF
SC0554'THE CENTER OF ALTERNATE U.S. HIGHWAY 101, 30 FEET WEST OF THE CENTER
SC0554'OF THE ROAD SOUTH TO FORT CLATSOP, 25 FEET NORTHEAST OF A POWER POLE,
SC0554'13 FEET NORTHEAST OF THE EAST END OF A HISTORIC SIGN, 2 FEET NORTHEAST
SC0554'OF A WITNESS POST AND 2 FEET ABOVE THE LEVEL OF THE ROAD. THE MONUMENT
SC0554'IS FLUSH.
SC0554
SC0554                          STATION RECOVERY (1984)
SC0554
SC0554'RECOVERY NOTE BY US POWER SQUADRON 1984
SC0554'HIGHWAY IS NOW U.S. 101 ALT.
SC0554
SC0554                          STATION RECOVERY (1987)
SC0554
SC0554'RECOVERY NOTE BY US POWER SQUADRON 1987 (GAN)
SC0554'RECOVERED IN GOOD CONDITION.
SC0554
SC0554                          STATION RECOVERY (1987)
SC0554
SC0554'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1987
SC0554'RECOVERED IN GOOD CONDITION, A NEW DESCRIPTION FOLLOWS.  8.1 KM (5.05
SC0554'MI) SOUTHERLY ALONG U.S. HIGHWAY 101 BUSINESS FROM ITS JUNCTION WITH
SC0554'U.S. HIGHWAY 101 IN ASTORIA, 12.2 M (40.0 FT) SOUTH OF THE
SC0554'CENTERLINE OF THE HIGHWAY, 8.9 M (29.2 FT) WEST OF THE CENTERLINE OF
SC0554'A PAVED ROAD LEADING SOUTH, AND 7.6 M (24.9 FT) NORTHEAST OF UTILITY
SC0554'POLE NUMBER 251106.
SC0554'THE MARK IS 0.4 METERS  NW FROM  A WITNESS POST
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SC0554'THE MARK IS 0.6 M ABOVE THE HIGHWAY.
SC0554
SC0554   STATION RECOVERY (1989)
SC0554
SC0554'RECOVERY NOTE BY US POWER SQUADRON 1989 (RCC)
SC0554'RECOVERED IN GOOD CONDITION.
SC0554
SC0554   STATION RECOVERY (1996)
SC0554
SC0554'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1996 (JGF)
SC0554'RECOVERED AS DESCRIBED.
SC0554
SC0554   STATION RECOVERY (1996)
SC0554
SC0554'RECOVERY NOTE BY JE CHANCE AND ASSOCIATES 1996 (KAL)
SC0554'RECOVERED IN GOOD CONDITION AS DESCRIBED BY NGS 1987 WITH FOLLOWING
SC0554'ADDITIONS AND TIES THE STATION IS LOCATED ABOUT 8.5 MILES (13.7 KM)
SC0554'NORTH OF GEARHART, 3 MILES (4.8 KM) SOUTHEAST OF WARRENTON AND 3 MILES
SC0554'(4.8 KM) SOUTHWEST OF ASTORIA. THE STATION IS LOCATED 12.2 M (40.0
SC0554'FT) NORTHEAST OF A -DO NOT ENTER- SIGN, 10.5 M (34.4 FT) NORTH OF A
SC0554'GAS PIPELINE WARNING POST, 7.2 M (23.6 FT) NORTHEAST OF THE CENTER OF
SC0554'A UTILITY POLE, 17.4 M (57.1 FT) WEST OF A STOP SIGN AND 0.35 M (1.15
SC0554'FT) NORTHWEST OF A WITNESS POST
SC0554
SC0554   STATION RECOVERY (1997)
SC0554
SC0554'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SC0554'RECOVERED AS DESCRIBED.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7006 ***********************************************************************
 AH7006  DESIGNATION -  WORM
 AH7006  PID         -  AH7006
 AH7006  STATE/COUNTY-  WA/GRAYS HARBOR
 AH7006  USGS QUAD   -  POINT BROWN (1984)
 AH7006
 AH7006                        *CURRENT SURVEY CONTROL
 AH7006  ______________________________________________________________________
 AH7006* NAD 83(1991)-  46 53 17.30235(N)    124 07 34.29610(W)     ADJUSTED
 AH7006* NAVD 88     -         9.90   (meters)      32.5    (feet)  GPS OBS
 AH7006  ______________________________________________________________________
 AH7006  X           -  -2,449,831.058 (meters)                     COMP
 AH7006  Y           -  -3,614,824.573 (meters)                     COMP
 AH7006  Z           -   4,633,264.190 (meters)                     COMP
 AH7006  LAPLACE CORR-          12.23  (seconds)                    DEFLEC96
 AH7006  ELLIP HEIGHT-         -14.71  (meters)                     GPS OBS
 AH7006  GEOID HEIGHT-         -24.45  (meters)                     GEOID96
 AH7006
 AH7006  HORZ ORDER  -  FIRST
 AH7006  ELLP ORDER  -  THIRD     CLASS II
 AH7006
 AH7006.The horizontal coordinates were established by GPS observations
 AH7006.and adjusted by the National Geodetic Survey in January 1999.
 AH7006
 AH7006.The orthometric height was determined by GPS observations and a
 AH7006.high-resolution geoid model using precise GPS observation and
 AH7006.processing techniques.
 AH7006
 AH7006.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7006
 AH7006.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7006
 AH7006.The ellipsoidal height was determined by GPS observations
 AH7006.and is referenced to NAD 83.
 AH7006
 AH7006.The geoid height was determined by GEOID96.
 AH7006
 AH7006;                    North         East     Units   Scale      Converg.
 AH7006;SPC WA S     -   179,169.649   223,748.246   MT  0.99992857 -2 38 02.6
 AH7006;UTM  10      - 5,193,349.185   414,202.327   MT  0.99969047 -0 49 19.9
 AH7006
 AH7006                           SUPERSEDED SURVEY CONTROL
 AH7006
 AH7006.No superseded survey control is available for this station.
 AH7006
 AH7006_MARKER: DD = SURVEY DISK
 AH7006_SETTING: 4 = OBJECT SURROUNDED BY MASS OF CONCRETE
 AH7006_STAMPING: WORM 1988
 AH7006_PROJECTION: FLUSH
 AH7006_MAGNETIC: O = OTHER; SEE DESCRIPTION
 AH7006_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AH7006+STABILITY: SURFACE MOTION
 AH7006_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7006+SATELLITE: SATELLITE OBSERVATIONS - 1988
 AH7006
 AH7006  HISTORY     - Date     Condition        Recov. By
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AH7006 HISTORY   - 1988   MONUMENTED   USE
AH7006
AH7006   STATION DESCRIPTION
AH7006
AH7006'DESCRIBED BY US ENGINEERS 1988
AH7006'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .
AH7006'THE STATION IS LOCATED IN THE CITY OF WESTPORT. FROM THE INTERSECTION
AH7006'OF SR 105 AND SR 105 SPUR FOLLOW 105 SPUR NORTH TO OCEAN AVENUE. TURN
AH7006'LEFT (WEST) AND FOLLOW OCEAN AVENUE WEST PAST THE WESTPORT LIGHTHOUSE
AH7006'TO A BEACH ACCESS PARKING AREA ON THE NORTH SIDE OF ROAD. PARK
AH7006'VEHICLE AND FOLLOW CEMENT WALKWAY WEST (THEN NORTH) ABOUT 70 M (229.7
AH7006'FT) TO STATION ON LEFT. THE STATION IS 0.45 MILES (0.72 KM) WEST (258
AH7006'DEGREES GRID) FROM THE WESTPORT LIGHTHOUSE, 19 M (62.3 FT) WEST OF THE
AH7006'CENTER OF THE CEMENT WALKWAY WHEN MEASURED NEAR A HISTORICAL
AH7006'INFORMATION MARKER, 2.8 M (9.2 FT) WEST OF THE WEST EDGE OF A WOODEN
AH7006'HANDICAPPED ACCESSIBLE BEACH OVERLOOK, AND 0.9 M (3.0 FT) EAST OF A
AH7006'ORANGE NGS WITNESS POST. A 6 FT (1.8 M) STEEL ANGLE IRON IS DRIVEN 4
AH7006'FT (1.2 M) INTO THE GROUND AND IS LOCATED 1 INCH WEST OF THE WITNESS
AH7006'POST. THE STATION IS A COE ALUMINUM DISK SET IN CONCRETE. THE DISK IS
AH7006'STAMPED WORM 1988.

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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 AH7004 ***********************************************************************
 AH7004  DESIGNATION -  X 1
 AH7004  PID         -  AH7004
 AH7004  STATE/COUNTY-  WA/GRAYS HARBOR
 AH7004  USGS QUAD   -  POINT BROWN (1984)
 AH7004
 AH7004                         *CURRENT SURVEY CONTROL
 AH7004  ______________________________________________________________________
 AH7004* NAD 83(1991)-  46 55 41.92656(N)    124 10 21.17623(W)     ADJUSTED
 AH7004* NAVD 88     -         7.10   (meters)      23.3    (feet)  GPS OBS
 AH7004  ______________________________________________________________________
 AH7004  X           -  -2,450,921.855 (meters)                     COMP
 AH7004  Y           -  -3,610,141.373 (meters)                     COMP
 AH7004  Z           -   4,636,313.076 (meters)                     COMP
 AH7004  LAPLACE CORR-          10.03  (seconds)                    DEFLEC96
 AH7004  ELLIP HEIGHT-         -17.67  (meters)                     GPS OBS
 AH7004  GEOID HEIGHT-         -24.61  (meters)                     GEOID96
 AH7004
 AH7004  HORZ ORDER  -  FIRST
 AH7004  ELLP ORDER  -  THIRD     CLASS II
 AH7004
 AH7004.The horizontal coordinates were established by GPS observations
 AH7004.and adjusted by the National Geodetic Survey in January 1999.
 AH7004
 AH7004.The orthometric height was determined by GPS observations and a
 AH7004.high-resolution geoid model using precise GPS observation and
 AH7004.processing techniques.
 AH7004
 AH7004.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 AH7004
 AH7004.The Laplace correction was computed from DEFLEC96 derived deflections.
 AH7004
 AH7004.The ellipsoidal height was determined by GPS observations
 AH7004.and is referenced to NAD 83.
 AH7004
 AH7004.The geoid height was determined by GEOID96.
 AH7004
 AH7004;                    North         East     Units   Scale      Converg.
 AH7004;SPC WA S     -   183,793.925   220,427.159   MT  0.99993252 -2 40 03.8
 AH7004;UTM  10      - 5,197,865.099   410,737.539   MT  0.99969793 -0 51 23.8
 AH7004
 AH7004                           SUPERSEDED SURVEY CONTROL
 AH7004
 AH7004.No superseded survey control is available for this station.
 AH7004
 AH7004_MARKER: DD = SURVEY DISK
 AH7004_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 AH7004_STAMPING: X 1
 AH7004_PROJECTION: FLUSH
 AH7004_MAGNETIC: O = OTHER; SEE DESCRIPTION
 AH7004_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AH7004+STABILITY: SURFACE MOTION
 AH7004_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AH7004+SATELLITE: SATELLITE OBSERVATIONS - 1997
 AH7004
 AH7004  HISTORY     - Date     Condition        Recov. By
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AH7004  HISTORY     - 1997     MONUMENTED       LOCENG
AH7004  HISTORY     - 19990419 GOOD             WADECO
AH7004
AH7004                          STATION DESCRIPTION
AH7004
AH7004'DESCRIBED BY LOCAL ENGINEER (INDIVIDUAL OR FIRM) 1997 (RCD)
AH7004'DESCRIBED BY THE WASHINGTON STATE DEPARTMENT OF ECOLOGY 1997 (RCD) .
AH7004'THE STATION IS LOCATED IN THE CITY OF OCEAN SHORES.  FROM THE
AH7004'INTERSECTION OF CHANCE ALAMER ROAD AND OCEAN SHORES BOULEVARD SW
AH7004'PROCEED SOUTH ON OCEAN SHORES BOULEVARD TO THE NORTH JETTY AND A
AH7004'PUBLIC BEACH ACCESS POINT.  THE STATION IS 66 M (216.5 FT) NORTH OF
AH7004'THE JETTY, 30 M (98.4 FT) EAST OF THE SOUTHEAST CORNER OF A CEMENT
AH7004'BLOCK RESTROOM, 73 M (239.5 FT) WEST (214 DEGREES GRID) FROM THE FRONT
AH7004'DOOR OF THE HOUSE LOCATED AT 1599 OCEAN SHORES BOULEVARD SW. THE
AH7004'STATION IS ON A LOW DUNE WEST OF THE JETTY PARKING AREA AND LEVEL WITH
AH7004'THE GROUND.  THE STATION IS A BASS SURVEY DISK ATTACHED TO A 55 GALLON
AH7004'STEEL DRUM FILLED WITH CONCRETE SET VERTICALLY IN THE GROUND.  THE
AH7004'DISK IS STAMPED X-1.
AH7004
AH7004                          STATION RECOVERY (1999)
AH7004
AH7004'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1999 (RCD)
AH7004'RECOVERED AS DESCRIBED.  ON MARCH 3, 1999 A LARGE STORM HIT AT HIGH
AH7004'TIDE AND WAVES OVER TOPPED THE GRAYS HARBOR NORTH JETTY.  RESULTING
AH7004'EROSION DESTROYED THE RESTROOMS DESCRIBED IN THE PREVIOUS DESCRIPTION.
AH7004'THE STATION IF 5 M (16.4 FT) FROM A 4 M (13.1 FT) SCARP.  REFERENCE
AH7004'MARK 1 WAS SET AND LEVELED TO BY THIS PARTY ON MARCH 12, 1999 USING
AH7004'SECOND ORDER LEVELING METHODS.  THE REFERENCE MARK IS 165.59 M (543.27
AH7004'FT) NORTH, 13.41 M (44.00 FT) EAST, AND 1.415 M (4.642 FT) LOWER THAN
AH7004'THE STATION.  TO REACH THE REFERENCE MARK FROM THE STATION PROCEED
AH7004'NORTH ABOUT 170 M (557.7 FT) ALONG THE EAST EDGE OF OCEAN SHORES
AH7004'BOULEVARD.  THE REFERENCE MARK IS 5 M (16.4 FT) EAST OF THE EAST EDGE
AH7004'OF THE ROAD OR 37 M (121.4 FT) EAST AND 27 M (88.6 FT) SOUTH OF THE SE
AH7004'CORNER OF THE GARAGE LOCATED AT THE BREESES DEL MAR CONDOMINIMUMS.  AN
AH7004'ORANGE WITNESS POST IS 1 M (3.3 FT) EAST OF THE REFERENCE MARK.  THE
AH7004'REFERENCE MARK IS A 2.5 INCH ALUMINUM CAP ATTACHED TO A 3.0 M (9.8 FT)
AH7004'STAINLESS STEEL ROD DRIVEN INTO THE GROUND.  THE STATION IS ACCESSED
AH7004'THROUGH A 4-INCH PVC PIPE SET IN CONCRETE.  THE DISK IS STAMPED X-1
AH7004'1999 WITH A WASHINGTON DEPARTMENT OF ECOLOGY INSCRIPTION.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SD0323 ***********************************************************************
 SD0323  FBN          -  This is a Federal Base Network Control Station.
 SD0323  DESIGNATION -  X 537
 SD0323  PID          -  SD0323
 SD0323  STATE/COUNTY-  WA/PACIFIC
 SD0323  USGS QUAD    -  OYSTERVILLE (1985)
 SD0323
 SD0323                          *CURRENT SURVEY CONTROL
 SD0323  ______________________________________________________________________
 SD0323* NAD 83(1991)-  46 30 57.01664(N)    124 03 23.97009(W)     ADJUSTED
 SD0323* NAVD 88      -         5.763  (meters)      18.91   (feet)  ADJUSTED
 SD0323  ______________________________________________________________________
 SD0323  X            -  -2,462,308.983 (meters)                     COMP
 SD0323  Y            -  -3,642,747.759 (meters)                     COMP
 SD0323  Z            -   4,604,878.665 (meters)                     COMP
 SD0323  LAPLACE CORR-          16.10  (seconds)                     DEFLEC96
 SD0323  ELLIP HEIGHT-         -18.54  (meters)                      GPS OBS
 SD0323  GEOID HEIGHT-         -24.15  (meters)                      GEOID96
 SD0323  DYNAMIC HT   -          5.764 (meters)      18.91  (feet)  COMP
 SD0323  MODELED GRAV-     980,726.0   (mgal)                        NAVD 88
 SD0323
 SD0323  HORZ ORDER   -  B
 SD0323  VERT ORDER   -  FIRST     CLASS II
 SD0323  ELLP ORDER   -  THIRD     CLASS II
 SD0323
 SD0323.The horizontal coordinates were established by GPS observations
 SD0323.and adjusted by the National Geodetic Survey in May 1991.
 SD0323
 SD0323.The orthometric height was determined by differential leveling
 SD0323.and adjusted by the National Geodetic Survey in June 1991.
 SD0323
 SD0323.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SD0323
 SD0323.The Laplace correction was computed from DEFLEC96 derived deflections.
 SD0323
 SD0323.The ellipsoidal height was determined by GPS observations
 SD0323.and is referenced to NAD 83.
 SD0323
 SD0323.The geoid height was determined by GEOID96.
 SD0323
 SD0323.The dynamic height is computed by dividing the NAVD 88
 SD0323.geopotential number by the normal gravity value computed on the
 SD0323.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 SD0323.degrees latitude (G = 980.6199 gals.).
 SD0323
 SD0323.The modeled gravity was interpolated from observed gravity values.
 SD0323
 SD0323;                    North         East     Units   Scale      Converg.
 SD0323;SPC WA S      -   137,586.972   227,176.551   MT  0.99991533 -2 35 00.7
 SD0323;UTM  10       - 5,151,905.556   418,944.391   MT  0.99968076 -0 46 00.2
 SD0323
 SD0323|---------------------------------------------------------------------|
 SD0323| PID    Reference Object                      Distance      Geod. Az  |
 SD0323|                                                            dddmmss.s |
 SD0323| AH7020 PC 035                              110.871 METERS 31031     |
 SD0323|---------------------------------------------------------------------|
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SD0323
SD0323   SUPERSEDED SURVEY CONTROL
SD0323
SD0323 ELLIP HT   -   -18.47 (m)   GP(   ) 4 1
SD0323 NGVD 29   -   4.74   (m)   15.6   (f) LEVELING   3
SD0323
SD0323.Superseded values are not recommended for survey control.
SD0323.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
SD0323.See file dsdata.txt to determine how the superseded data were derived.
SD0323
SD0323_MARKER: A = ALUMINUM MARKER
SD0323_SETTING: 15 = METAL ROD DRIVEN INTO GROUND. SEE TEXT FOR ADDITIONAL
SD0323+WITH SETTING: INFORMATION.
SD0323_STAMPING: X 537 1987
SD0323_PROJECTION: FLUSH
SD0323_MAGNETIC: O = OTHER; SEE DESCRIPTION
SD0323_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
SD0323_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
SD0323+SATELLITE: SATELLITE OBSERVATIONS - February 08, 1991
SD0323_ROD/PIPE-DEPTH: 18.1 meters
SD0323
SD0323 HISTORY   - Date   Condition   Recov. By
SD0323 HISTORY   - 1987   MONUMENTED   WA-049
SD0323 HISTORY   - 1987   GOOD   NGS
SD0323 HISTORY   - 19900128 GOOD   NGS
SD0323 HISTORY   - 19910208 GOOD
SD0323 HISTORY   - 19970725 GOOD   WADECO
SD0323
SD0323   STATION DESCRIPTION
SD0323
SD0323'DESCRIBED BY NATIONAL GEODETIC SURVEY 1987
SD0323'3.4 KM (2.10 MI) NORTH FROM OCEAN PARK.
SD0323'THE MARK IS ABOVE LEVEL WITH THE STREET.
SD0323'2.29 KM (1.40 MI) NORTH ALONG VERNON AVENUE FROM THE INTERSECTION OF
SD0323'BAY AVENUE IN OCEAN PARK, THENCE 0.64 KM (0.40 MI) WEST ALONG JO
SD0323'JOHNS ROAD, THENCE 0.48 KM (0.30 MI) NORTH ALONG H STREET, 2.74 M
SD0323'(9.0 FT) SOUTH OF THE CENTERLINE OF 295TH STREET, 7.92 M (26.0 FT)
SD0323'WEST OF THE EXTENDED CENTERLINE OF H STREET NORTH, 6.4 M (21.0 FT)
SD0323'EAST OF THE EXTENDED CENTERLINE OF H STREET SOUTH. NOTE--ACCESS TO
SD0323'DATUM POINT IS HAD THROUGH AN 8-INCH IRON LOGO CAP.
SD0323
SD0323   STATION RECOVERY (1990)
SD0323
SD0323'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1990
SD0323'THE STATION IS LOCATED ABOUT 40.2 KM (25.0 MI) WEST OF FRANCIS, 27.4
SD0323'KM (17.0 MI) NORTH OF ILWACO, 24.2 KM (15.0 MI) SOUTHWEST OF SOUTH
SD0323'BEND AND AT OCEAN PARK IN A CITY STREET.
SD0323'TO REACH FROM THE BLINKING RED LIGHT AT THE INTERSECTION OF VERNON
SD0323'AVENUE AND BAY STREET IN OCEAN PARK, GO NORTH ON VERNON AVENUE FOR
SD0323'2,25 KM TO A T-INTERSECTION. TURN LEFT AND GO WEST ON JOHNS ROAD FOR
SD0323'0.64 KM (0.40 MI) TO A SIDE ROAD RIGHT. TURN RIGHT AND GO NORTH ON H
SD0323'STREET FOR 0.48 KM (0.30 MI) TO 295TH STREET, AN OFFSET CORSSROAD AND
SD0323'THE STATION.
SD0323'THE MARK IS A STAINLESS STEEL ROD SET IN AN IRON MONUMENT CASE AND
SD0323'COVER THAT IS FLUSH WITH THE ROAD SURFACE. IT IS 7.9 M (25.9 FT)
SD0323'WEST OF THE EXTENDED CENTER OF H STREET NORTH, 6.4 M (21.0 FT) EAST OF
SD0323'THE EXTENDED CENTER OF H STREET SOUTH AND 2.7 M (8.9 FT) SOUTH OF THE

```
SD0323'CENTER OF 295TH STREET.
SD0323
SD0323                          STATION RECOVERY (1991)
SD0323
SD0323'RECOVERED 1991
SD0323'RECOVERED IN GOOD CONDITION.
SD0323
SD0323                          STATION RECOVERY (1997)
SD0323
SD0323'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SD0323'RECOVERED AS DESCRIBED.
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1        National Geodetic Survey,   Retrieval Date = OCTOBER  6, 1999
 SC1033 ***********************************************************************
 SC1033  DESIGNATION -  X 711
 SC1033  PID         -  SC1033
 SC1033  STATE/COUNTY-  OR/CLATSOP
 SC1033  USGS QUAD   -  GEARHART (1984)
 SC1033
 SC1033                        *CURRENT SURVEY CONTROL
 SC1033  ______________________________________________________________________
 SC1033* NAD 83(1991)-  46 04 33.09141(N)    123 55 01.55412(W)     ADJUSTED
 SC1033* NAVD 88     -         9.742  (meters)      31.96   (feet)  ADJUSTED
 SC1033  ______________________________________________________________________
 SC1033  X           -  -2,473,158.669 (meters)                     COMP
 SC1033  Y           -  -3,678,076.891 (meters)                     COMP
 SC1033  Z           -   4,571,090.910 (meters)                     COMP
 SC1033  LAPLACE CORR-          15.88  (seconds)                    DEFLEC96
 SC1033  ELLIP HEIGHT-         -13.71  (meters)                     GPS OBS
 SC1033  GEOID HEIGHT-         -23.20  (meters)                     GEOID96
 SC1033  DYNAMIC HT  -           9.742 (meters)      31.96  (feet)  COMP
 SC1033  MODELED GRAV-     980,705.3   (mgal)                       NAVD 88
 SC1033
 SC1033  HORZ ORDER  -  FIRST
 SC1033  VERT ORDER  -  FIRST     CLASS II
 SC1033  ELLP ORDER  -  THIRD     CLASS II
 SC1033
 SC1033.The horizontal coordinates were established by GPS observations
 SC1033.and adjusted by the National Geodetic Survey in January 1999.
 SC1033
 SC1033.The orthometric height was determined by differential leveling
 SC1033.and adjusted by the National Geodetic Survey in June 1991.
 SC1033.WARNING-GPS observations at this control monument resulted in a GPS
 SC1033.derived orthometric height which differed from the leveled height by
 SC1033.more than one decimeter (0.1 meter).
 SC1033
 SC1033.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 SC1033
 SC1033.The Laplace correction was computed from DEFLEC96 derived deflections.
 SC1033
 SC1033.The ellipsoidal height was determined by GPS observations
 SC1033.and is referenced to NAD 83.
 SC1033
 SC1033.The geoid height was determined by GEOID96.
 SC1033
 SC1033.The dynamic height is computed by dividing the NAVD 88
 SC1033.geopotential number by the normal gravity value computed on the
 SC1033.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 SC1033.degrees latitude (G = 980.6199 gals.).
 SC1033
 SC1033.The modeled gravity was interpolated from observed gravity values.
 SC1033
 SC1033;                     North         East     Units   Scale      Converg.
 SC1033;SPC OR N     -   273,316.100 2,235,735.728   MT  1.00002018 -2 25 24.1
 SC1033;UTM  10      - 5,102,884.775   429,084.168   MT  0.99966182 -0 39 38.1
 SC1033
 SC1033                          SUPERSEDED SURVEY CONTROL
 SC1033
 SC1033.No superseded survey control is available for this station.
```

SC1033
SC1033_MARKER: DV = VERTICAL CONTROL DISK
SC1033_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
SC1033_STAMPING: X 711 1987
SC1033_PROJECTION: FLUSH
SC1033_MAGNETIC: I = MARKER IS A STEEL ROD
SC1033_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
SC1033_ROD/PIPE-DEPTH: 11.1 meters
SC1033
SC1033 HISTORY   - Date   Condition   Recov. By
SC1033 HISTORY   - 1987   MONUMENTED   NGS
SC1033 HISTORY   - 1987   GOOD   USPSQD
SC1033 HISTORY   - 19971204 GOOD   WADECO
SC1033
SC1033   STATION DESCRIPTION
SC1033
SC1033'DESCRIBED BY NATIONAL GEODETIC SURVEY 1987
SC1033'9.4 KM (5.85 MI) NORTH FROM SEASIDE.
SC1033'9.4 KM (5.85 MI) NORTHERLY ALONG U.S. HIGHWAY 101 FROM ITS JUNCTION
SC1033'WITH BROADWAY AVENUE IN SEADIDE, 47.5 M (155.8 FT) SOUTH OF THE
SC1033'CENTER OF DELLMOOR LOOP ROAD, 25.9 M (85.0 FT) NORTH OF THE EXTENDED
SC1033'CENTER OF A DRIVEWAY, 12.8 M (42.0 FT) WEST OF THE CENTERLINE OF THE
SC1033'HIGHWAY, AND 1.0 M (3.3 FT) SOUTH OF UTILITY POLE NUMBER 228 A.
SC1033'NOTE--ACCESS TO DATUM POINT IS HAD THROUGH A 5-INCH LOGO CAP.
SC1033'THE MARK IS 0.3 METERS E FROM A WITNESS POST AND FENCE
SC1033'THE MARK IS ABOVE LEVEL WITH THE HIGHWAY.
SC1033
SC1033   STATION RECOVERY (1987)
SC1033
SC1033'RECOVERY NOTE BY US POWER SQUADRON 1987 (GAN)
SC1033'RECOVERED IN GOOD CONDITION.
SC1033
SC1033   STATION RECOVERY (1997)
SC1033
SC1033'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1997 (RCD)
SC1033'RECOVERED AS DESCRIBED. STATION IS SOUTHWEST OF THE INTERSECTION OF
SC1033'US 101 WITH WESTLAKE ROAD/DELMOER LOOP ROAD. FROM INTERSECTION GO
SC1033'SOUTH ON THE WEST SIDE OF ROAD 40 M (131.2 FT) TO POWER POLE NO.
SC1033'221404 AND WITNESS POST. MARK IS 0.3 M (1.0 FT) FROM WITNESS POST AND
SC1033'ABOUT 8 M (26.2 FT) WEST OF THE CENTERLINE OF US 101. THE STATION IS
SC1033'1.8 MILES (2.9 KM) NORTH OF THE INTERSECTION OF US 101 AND HIGHLANDS
SC1033'ROAD (DELRAY BEACH ACCESS).

SECTION 3: ADDITIONAL DATA SHEETS

Coordinates shown were derived by the Washington Department of Ecology and are not available from the NGS. NAVD 88 elevation was derived from GPS data, elevation accuracy estimated to be ±2.5 cm. Horizontal coordinates meet First Order standards.

DESIGNATION: ASTOR (ALIAS: ASTO)
PID NOT AN NGS STATION
STATE/COUNTY: WA/CLATSOP
USGS QUAD: WARRENTON (1985)
SPC WA SOUTH: 97,089.346 N 238,953.073 E METERS
NAD 83(1991) 46 09 23.38364 N 123 52 50.56747 W
NAVD88: 3.022 meters
ELLIPSOID: -20.280 meters
MARK TYPE: DIMPLE ON AIRCRAFT TIE DOWN
STAMPING: NO STAMPING

HISTORY	- Date	Condition	Recov. By
HISTORY	- 1997	MONUMENTED	NASA
HISTORY	- 1998	GOOD	WADECO

DESCRIPTION:

DESCRIBED BY NASA 1997 (EARL FREDRICK)
NEAR ASTORIA, OR
STATION IS LOCATED ON A TAXIWAY/PARKING AREA AT THE ASTORIA MUNICIPAL AIRPORT. TO OBTAIN PERMISSION TO DRIVE TO THE STATION CALL 503-325-4521 AND TALK TO THE AIRPORT MANAGER (RON LARSEN).

FROM THE SOUTHEAST CORNER OF THE ASTORIA TERMINAL BUILDING DRIVE THROUGH GATE AND PAST SMALL PLANE HANGERS (GREEN). TURN NORTHWEST AND DRIVE ALONG THE EAST EDGE OF THE TAXIWAY (NEXT TO GRASS “TRAFFIC” ISLANDS) PAST TWO LARGE HANGERS (WHITE, NO LONGER USED FOR AIRCRAFT). CONTINUE NORTHWEST UNTIL ON-LINE WITH A GREEN ONE STORY BUILDING WITH OBSERVATION/CONTROL TOWER (CURRENTLY THE NATIONAL WEATHER SERVICE BUILDING, FORMERLY THE FBO BUILDING) ON YOUR LEFT.THE STATION IS A DIMPLE ON TOP OF AN AIRCRAFT TIE DOWN. THE TIE DOWN IS 41.745 M NNW OF AN AIRCRAFT CROSSOVER (TENTH TIE DOWN FROM THE CROSSOVER) AND 59 CM SOUTH FROM A CEMENT RUNNEL WHICH RUNS BESIDE THE TAXIWAY FOR DRAINING THE TAXIWAY. THE STATION TIE DOWN HAS BEEN PAINTED RED.

STATION RECOVERY

RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1998 (RCD)
RECOVERED AS DESCRIBED. A YELLOW FLASHING LIGHT IS REQUIRED FOR VEHICLE TO ACCESS THE STATION.

Coordinates shown were derived by the Washington Department of Ecology and are not available from the NGS. NAVD 88 elevation was derived from GPS data, elevation accuracy estimated to be ±2.5 cm. Horizontal coordinates meet First Order standards.

DESIGNATION: BC TIDAL
PID NOT AN NGS STATION
STATE/COUNTY: WA/PACIFIC
USGS QUAD: BAY CENTER (1984)
SPC WA SOUTH: 149158.719 N 236074.214 E METERS
NAD 83(1991) 46 37 24.22124 N 123 56 50.65111 W
NAVD88: 4.234 meters
ELLIPSOID: -19.403 meters
MARK TYPE: 2.5-INCH STEEL WASHER AND PK NAIL
STAMPING: BC TIDAL

HISTORY	- Date	Condition	Recov. By
HISTORY	- 1998	MONUMENTED	WADECO

DESCRIPTION:

THE TIDAL GAUGE IS EAST OF THE TOWN OF BAY CENTER AT THE BAY CENTER MARICULTURE CO. BUILDING (BAY CENTER FARMS) ON THE PALIX RIVER. THE COMPANY BUILDING IS BUILT ON A PIER THAT IS NORTH OF BAY CENTER DIKE ROAD AND ON THE SOUTH BANK OF THE RIVER. THE TIDE GAUGE IS LOCATED ON THE SECOND TO LAST PILING ON THE WEST END OF THE PIER JUST BEFORE YOU GO DOWN A RAMP TO A FLOATING DOCK. AS YOU GO DOWN THE RAMP THE PILING IS BENEATH THE PIER TO THE EAST. DOCK OWNER IS DICK WILSON, PHONE (360) 875-6172.

DO TO LIMITED GPS VISIBILITY AT THE TIDE GAUGE THE STATION WAS POSITIONED ABOUT 65 METERS SOUTH OF A POINT ON THE PIER THAT WAS DIRECTLY OVER THE GAUGE. LEVELS WERE RUN FROM THIS POINT TO THE STATION. THE POINT ON THE PIER DECK IS 0.134 M LOWER THAN THE STATION.

FROM THE INTERSECTION OF BAY CENTER DIKE ROAD AND US HIGHWAY 101 PROCEED WEST 2 MILES ON BAY CENTER DIKE ROAD TO THE STATION ON LEFT. THE MARK IS SET IN ASPHALT AT THE GRAVEL PULL-OFF AREA ACROSS FROM THE BAY CENTER FARMS BUILDING AND IS 15.9 M SOUTH OF THE SOUTH FACING FOUNDATION OF THE BAY CENTER FARMS BUILDING AND 9.17 M EAST OF THE ENTRANCE DOOR TO THE "SEASONAL SEAFOODS STORE". THE MARK IS A 2.5-INCH STEEL WASHER AND PK NAIL STAMPED BC TIDAL.

Coordinates shown were derived by the Washington Department of Ecology and are not available from the NGS. NAVD 88 elevation was derived from GPS data, elevation accuracy estimated to be ±2.5 cm. Horizontal coordinates meet First Order standards.

DESIGNATION: NC TIDAL

PID	NOT AN NGS STATION
STATE/COUNTY:	WA/PACIFIC
USGS QUAD:	OCEAN PARK (1985)
SPC WA SOUTH:	135895.987 N 229622.823 E METERS
NAD 83(1991)	46 30 05.85887 N 124 01 25.77343 W
NAVD88:	6.007 meters
ELLIPSOID:	-18.087 meters
MARK TYPE:	2.5-INCH STEEL WASHER AND PK NAIL
STAMPING:	NC TIDAL

HISTORY	- Date	Condition	Recov. By
HISTORY	- 1998	MONUMENTED	WADECO

DESCRIPTION:

THE TIDE GAUGE IS IN THE TOWN OF NAHCOTTA. FROM THE NAHCOTTA BOAT BASIN FALLOW A DIRT ROAD EAST OUT TO THE BASIN BREAKWATER. THE TIDE GAUGE IS NEAR THE NORTHEAST MOST END OF THE BREAKWATER AND IS MOUNTED ON COAST GUARD STRUCTURE NO. 2 (WITH A FLASHING 4 SECOND LIGHT). STRUCTURE NO. 2 IS ABOUT 50 M NORTH OF STRUCTURE NO. 1, WHICH IS LOCATED ON THE NORTH END OF THE STONE BREAKWATER.

THE STATION IS LOCATED ON THE OBSERVATION DECK OF STRUCTURE NO. 2 WHICH IS CONSTRUCTED ON TOP OF THREE LARGE PILINGS THAT ARE STRAPED TOGETHER WITH STEEL ROPE. THIS STATION IS ONLY ACCESSABLE BY BOAT. THE MARK IS LOCATED DIRECTLY OVER THE GAUGE AND IS ABOUT 0.4 M EAST OF THE WEST EDGE OF THE OBSERVATION DECK. THE MARK IS A 2.5-INCH STEEL WASHER AND PK NAIL STAMPED NC TIDAL.

Coordinates shown were derived by the Washington Department of Ecology and are not available from the NGS. NAVD 88 elevation was derived from GPS data, elevation accuracy estimated to be ±2.5 cm. Horizontal coordinates meet First Order standards.

DESIGNATION: NR TIDAL

PID	NOT AN NGS STATION
ID:	05
STATE/COUNTY:	WA/PACIFIC
USGS QUAD:	LONG ISLAND (1985)
SPC WA SOUTH:	127535.464 N 238296.162 E METERS
NAD 83(1991)	46 25 47.67322 N 123 54 22.41666 W
NAVD88:	2.961 meters
ELLIPSOID:	-20.459 meters
MARK TYPE:	2.5-INCH STEEL WASHER AND PK NAIL
STAMPING:	NR TIDAL

HISTORY	- Date	Condition	Recov. By
HISTORY	- 1998	MONUMENTED	WADECO

DESCRIPTION:

THE TIDE GAUGE IS ON THE SOUTHWEST BANK OF THE NASELLE RIVER, JUST WEST OF THE NASELLE RIVER BRIDGE. THERE ARE SIX PILINGS WEST OF THE BRIDGE NEAR THE SOUTH BANK. THE GAUGE IS ON THE SECOND PILING AS ONE GOES WEST FROM THE BRIDGE.

PROCEED 12.9 MILES NORTHEAST FROM SEAVIEW, WA ON US HIGHWAY 101 TO THE INTERSECTION OF US 101 AND PARPALA ROAD, JUST SOUTH OF THE SOUTH END OF THE NASELLE RIVER BRIDGE. THERE ARE SIX PILINGS WEST OF THE BRIDGE NEAR THE SOUTH BANK. THE STATION IS ON THE SECOND PILING AS ONE GOES WEST FROM THE BRIDGE. THIS STATION IS ONLY ACCESSABLE BY BOAT. THE MARK IS A 2.5-INCH STEEL WASHER AND PK NAIL STAMPED NR TIDAL THIS IS A VERTICAL MARK ONLY. NOTE, THE COORDINATES SHOWN ARE FOR THE TOP OF THE PIPE THAT SUPPORTED THE GAUGE. THE SUPPORT PIPE WAS LEVEL WITH AND ABOUT 0.10 M FROM THE MARK.

Coordinates shown were derived by the Washington Department of Ecology and are not available from the NGS. NAVD 88 elevation was derived from GPS data, elevation accuracy estimated to be ±2.5 cm. Horizontal coordinates meet First Order standards.

DESIGNATION: SB TIDAL
PID NOT AN NGS STATION
STATE/COUNTY: WA/PACIFIC
USGS QUAD: SOUTH BEND (1985)
SPC WA SOUTH: 153728.636 N 246578.968 E METERS
NAD 83(1991) 46 40 06.66806 N 123 48 46.29584 W
NAVD88: 4.334 meters
ELLIPSOID: -18.476 meters
MARK TYPE: 2.5-INCH STEEL WASHER AND PK NAIL
STAMPING: SB TIDAL

HISTORY	- Date	Condition	Recov. By
HISTORY	- 1998	MONUMENTED	WADECO

DESCRIPTION:

THE TIDAL GAUGE IS IN THE TOWN OF SOUTH BEND AT THE WEST END OF TOWN AT THE FISHERMAN'S SEAFOOD INC. PIER. AT THE END OF THE PIER IS A YELLOW LADDER GOIND GOWN TO THE WATER. THE GAUGE IS ATTACHED TO THE FIRST INSET PILING BENEATH THE PIER, NOT THE BUMPER PILING, TO THE EAST OF THE LADDER.

THE STATION IS ABOUT 100 M NORTHWEST OF THE INTERSECTION OF A STREET AND US HIGHWAY 101 (ROBERT BUSH DRIVE) AT THE FISHERMAN'S SEAFOOD INC. PIER, THE WEST MOST COMMERCIAL PIER IN TOWN. THE MARK IS LOCATED DIRECTLY OVER THE GAUGE AND IS 1.1 M SOUTH OF THE NORTH EDGE OF THE PIER AND 4.2 M WEST OF THE EAST EDGE. NOTE, ON THE EAST EDGE OF THE FISHERMAN'S SEA FOOD INC. PIER THERE IS A RAMP LEADING DOWN TO A CITY OWNED FLOATING DOCK. THE MARK IS A 2.5-INCH STEEL WASHER AND PK NAIL STAMPED SB TIDAL

Horizontal coordinates shown were derived by the Washington Department of Ecology and are not available from the NGS. Horizontal coordinates meet First Order standards.

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SC0980 ***********************************************************************
SC0980  DESIGNATION -  T 530
SC0980  PID         -  SC0980
SC0980  STATE/COUNTY-  WA/PACIFIC
SC0980  USGS QUAD   -  NEMAH (1985)
SC0980
SC0980                         *CURRENT SURVEY CONTROL
SC0980  ______________________________________________________________________
SC0980* NAD 83(1991)-  46 31 57.75318(N)    123 53 20.00224(W)     GPS OBS
SC0980* NAVD 88     -        31.475  (meters)     103.26   (feet)  ADJUSTED
SC0980  ______________________________________________________________________
SC0980  ELLIP HEIGHT-           8.220 (meters)                     GPS OBS
SC0980  GEOID HEIGHT-         -23.116 (meters)                     GEOID96
SC0980  DYNAMIC HT  -          31.479 (meters)     103.28  (feet)  COMP
SC0980  MODELED GRAV-     980,752.4   (mgal)                       NAVD 88
SC0980
SC0980  HORZ ORDER  -  FIRST     (ESTIMATED BY ECOLOGY)
SC0980  VERT ORDER  -  FIRST     CLASS II
SC0980  ELLP ORDER  -  FOURTH    CLASS II (ESTIMATED BY ECOLOGY)
SC0980
SC0980.The horizontal coordinates were scaled from a topographic map and have
SC0980.an estimated accuracy of +/- 6 seconds.
SC0980
SC0980.The orthometric height was determined by differential leveling
SC0980.and adjusted by the National Geodetic Survey in June 1991.
SC0980
SC0980.The geoid height was determined by GEOID96.
SC0980
SC0980.The dynamic height is computed by dividing the NAVD 88
SC0980.geopotential number by the normal gravity value computed on the
SC0980.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
SC0980.degrees latitude (G = 980.6199 gals.).
SC0980
SC0980.The modeled gravity was interpolated from observed gravity values.
SC0980
SC0980;                  North         East        Units
SC0980;SPC WA S   -   138,893.909    240,118.114     MT (ESTIMATED BY ECOLOGY)
SC0980
SC0980                           SUPERSEDED SURVEY CONTROL
SC0980
SC0980  NAD 83(1986)-  46 32 01.     (N)    123 53 22.     (W)     SCALED
SC0980_MARKER: I = METAL ROD
SC0980_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
SC0980_STAMPING: T 530 1987
SC0980_PROJECTION: FLUSH
SC0980_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
SC0980_ROD/PIPE-DEPTH: 11.0 meters
SC0980
SC0980  HISTORY     - Date     Condition        Recov. By
SC0980  HISTORY     - 1987     MONUMENTED       NGS
SC0980  HISTORY     - 1998     GOOD             WADECO
SC0980
SC0980                           STATION DESCRIPTION
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SC0980
SC0980'DESCRIBED BY NATIONAL GEODETIC SURVEY 1987
SC0980'28.5 KM (17.70 MI) SW FROM SOUTH BEND.
SC0980'28.5 KM (17.70 MI) SOUTHWEST ALONG US HIGHWAY 101 FROM THE JUNCTION
SC0980'OF MEMORIAL AVENUE IN SOUTH BEND, 11.3 M (37.1 FT) WEST OF THE
SC0980'CENTERLINE OF THE HIGHWAY, 5.2 M (17.1 FT) WEST OF THE NORTH END OF
SC0980'AN 18-IN METAL PIPE CULVERT, 3.4 M (11.2 FT) SOUTH OF A WOODS ROAD
SC0980'LEADING WEST. NOTE--ACCESS TO DATUM POINT IS HAD THROUGH A 5-INCH
SC0980'LOGO CAP.
SC0980'THE MARK IS 0.30 METERS N FROM A WITNESS POST
SC0980'THE MARK IS 0.61 M ABOVE THE HIGHWAY.
SC0980
SC0980   STATION RECOVERY (1997)
SC0980
SC0980'RECOVERY NOTE BY WASHINGTON DEPARTMENT OF ECOLOGY 1998 (RCD)
SC0980'RECOVERED AS DESCRIBED. STATION IS BETWEEN MILE POSTS 36 AND 37 0N
SC0980'US 101, 11.3 M WEST OF THE CENTERLINE OF THE HIGHWAY, 3.4 M NORTH
SC0980'OF THE CENTER OF A GRAVEL STUB ROAD LEADING WEST, AND 5.2 M NORTHWEST
SC0980'OF THE NORTH END OF AN 18-INCH METAL CULVERT PIPE GOIND UNDER THE
SC0980'STUB ROAD AND RUNNING PARALLEL TO THE HIGHWAY.

SECTION 4:
NGS REPORT OF HORIZONTAL CONTROL AND VERTICAL COMPUTATIONS

SECTION 5:
THE IMPACT OF GEOID99 OF THE CONTROL NETWORK

THE IMPACT OF GEOID99 ON THE CONTROL NETWORK

Introduction

The NGS has produced a new high-resolution geoid model, GEOID99. This model replaces the existing gravimetric model, GEOID96. This new model, and its companion products G99SSS and DEFLEC99, became available on September 30, 1999.

The GEOID99 Gravimetric Model

“The GEOID99 model is known as a hybrid geoid model, combining gravimetric information with GPS ellipsoid heights on leveled benchmarks. The GEOID99 model was developed to support direct conversion between NAD 83 GPS ellipsoidal heights and NAVD 88 orthometric heights. When comparing the GEOID99 model with GPS ellipsoidal heights in the NAD 83 reference frame and leveling in the NAVD 88 datum, it is seen that GEOID99 has roughly a 4.6 cm absolute accuracy (one sigma) in the regions of GPS benchmark coverage. In regions with sparse (150km+) GPS benchmark coverage, less point accuracy may be evident; but relative accuracy at about a 1 to 2 part-per-million level, or better, should still be obtained. For users with less stringent accuracy requirements, simple height conversions to obtain NAVD 88 elevations based on NAD 83 ellipsoid heights and the GEOID99 model may be used in the conterminous United States. For users with more stringent accuracy requirements, a ‘Orthometric Height Correction Factor’ may be derived” (Smith and Roman 1999).

The difference of a GPS NAD 83 ellipsoid height at a known point and the associated GEOID99 height should not be expected to exactly match any give vertical datum. The results will be close when converting NAD 83 GPS ellipsoidal heights into NAVD 88 elevations; but not accurate enough for studies needing sub-decimeter accuracy. However, one can combine the precision of differential carrier phase GPS with the precision of GEOID99 height differences, to approach that of leveling by including at least one existing benchmark in the GPS survey. The difference between the published elevation and the height obtained from differencing the GPS ellipsoidal height and the GEOID99 height at the benchmark may be considered a local orthometric height correction factor. If one surveys an extensive area (> 100 km), and several benchmarks are observed, a trend may be detect in the correction factor of up to a one part-per-million. This may be error in the GEOID99 model (Smith and Roman 1999).

The NGS does not currently consider geoid-corrected GPS orthometric heights as a substitute for geodetic leveling in meeting the Federal Geodetic Control Subcommittee (FGCS) standards for vertical control networks; however, projects with less stringent requirements may be satisfied by the currently available geoid models. Widespread success has been achieved with the proceeding models, GEOID96, GEOID93 and GEOID90.

GEOID99 and Washington Coastal Geodetic Control Network

The GEOID96 model was used in the Washington Coastal Geodetic Control Network to obtain NAVD 88 elevations for stations without leveled NAVD 88 elevations (see Table 3, page 17). Tables 5 and 6 have been developed to compare predicted NAVD 88 elevations obtained using GEOID96 with similar elevations produced with GEOID99. The NAVD 88 benchmarks with GPS ellipsoid heights included in these tables are within a region extending inland 10 km from the Pacific Ocean and 30 km north and south of the mouth of the Columbia River. A local orthometric height correction factor was derived separately for Washington and Oregon for both GEOID96 and GEOID99. These correction factors were used with Equation 1b (Section 1, page 16) to obtain the predicted NAVD 88 elevation for each station and model.

Table 5. Predicted NAVD 88 elevations for five first order Washington benchmarks as calculated with GEOID96 and GEOID99. The difference between the predicted elevations obtained with GEOID96 and GEOID99 are shown in the last column. All elevations are in meters.

Station Designation	NAD 83 Ellipsoid	NAVD 88 Elevation	GEOID 96	Predicted NAVD 88 w/correction	GEOID 99	Predicted NAVD 88 w/correction	Difference G96-G99
MESS	-19.90	4.210	-23.96	4.20	-24.171	4.20	0.00
X 537	-18.54	5.763	-24.15	5.75	-24.356	5.74	0.01
M 536	-15.61	7.788	-23.29	7.82	-23.502	7.82	0.00
TURN RM 4	-18.91	5.358	-24.11	5.34	-24.321	5.34	0.00
944 0574 A TIDAL	-19.50	4.872	-24.24	4.88	-24.449	4.88	0.00
Correction Factor			0.14		-0.07		

Table 6. Predicted NAVD 88 elevations for five first order Oregon benchmarks as calculated with GEOID96 and GEOID99. The difference between the predicted elevations obtained with GEOID96 and GEOID99 are shown in the last column. All elevations are in meters.

Station Designation	NAD 83 Ellipsoid	NAVD 88 Elevation	GEOID 96	Predicted NAVD 88 w/correction	GEOID 99	Predicted NAVD 88 w/correction	Difference G96-G99
SMUR	-16.20	7.669	-23.65	7.70	-23.865	7.70	0.00
UU 282	-18.80	4.579	-23.11	4.56	-23.323	4.56	0.00
X 711	-13.71	9.742	-23.20	9.74	-23.41	9.74	0.00
MEADOW RESET	-11.51	11.834	-23.09	11.83	-23.305	11.83	0.00
SEASIDE RM 2	-15.99	7.297	-23.03	7.29	-23.253	7.29	0.00
Correction Factor			0.25		0.03		

In the portion of Washington included in the Southwest Washington Coastal Erosion Study, introduction of GEOID99 will have minimal impact (less than 0.02 m) on the calculated NAVD 88 elevation of stations within the network. Note, that both the GEOID96 and GEOID99 correction factors for Oregon and Washington have a difference of 0.11 m. This 0.11 m change occurs over a distance of less than 15 km (the distance from station 944 0574 A TIDAL to SMUR). Such a large variation in the correction factor over such a short distance is highly unlikely. To put this in perspective, from benchmark 944 0574 A TIDAL, located at the mouth of the Columbia River, to benchmark SOUTH, near Point Grenville, Washington, the GEOID96 correction factor varied only 0.07 m over a distance of more than 100-km.

The 0.11 m change in the correction factor has been interpreted by the NGS to imply that the orthometric heights used in the original NAVD 88 adjustment were not accurate enough to control the leveling network (Carlson 1998, Fredrick *et al.* 1996). The release of GEOID99 may have minimized the impact of this problem on GPS users in Oregon by forcing the geoid model to fit the published benchmark elevations. Benchmark elevation in this portion of Oregon have been found to be internally consistent, but may be in error when compared to Washington NAVD 88 elevations. As such, GPS users who need to compare GPS derived NAVD 88 elevations on both sides of the Columbia River are still faced with a dilemma.

Table 7 was developed to give an example of the impact of this problem. Table 7 shows the published elevations for seven stations whose elevations were derived from GPS observations using GEOID96 as well as the predicted elevation that would be obtained with GEOID99 using the 0.03 m correction faction derived for Oregon. Table 7 also shows the predicted NAVD 88 elevations that were obtained with GEOID96 using the 0.14 m correction factor derived for the southwest portion of Pacific County, Washington.

Table 7. Comparison of GPS derived NAVD 88 elevations for seven stations in northwest Oregon. Elevations shown are published (NGS), predicted with GEOID96 using the Washington 0.14 m correction factor, and predicted with GEOID99 using the Oregon 0.03 m correction factor. All elevations are in meters.

Station Description	Published NAVD 88 Elevation	GEOID96 Predicted Elevation	GEOID99 Predicted Elevation	Difference NGS-GEOID96	Difference NGS-GEOID99	Difference GEOID96-GEOID99
EAST JETTY 2	9.8	9.81	9.92	-0.01	-0.12	-0.11
MIT	28.7	28.75	28.85	-0.05	-0.15	-0.10
IREDALE RESET	8.6	8.59	8.70	-0.01	-0.10	-0.11
KIM	28.3	28.32	28.43	-0.02	-0.13	-0.11
RILEA	13.0	13.04	13.15	-0.04	-0.15	-0.11
DELRAY	11.5	11.54	11.65	-0.04	-0.15	-0.11
CANN	30.5	30.51	30.61	-0.01	-0.11	-0.10
			Mean	-0.03	-0.13	-0.11

The mean difference for the elevations calculated with the GEOID96 and GEOID99 models is -0.11 m, the same as the offset identified between the Washington and Oregon leveling networks. Thus, at this time there is no evidence to suggest that the use of GEOID99 in the northwest coastal portion of Clatsop County, Oregon, will provide better elevation for stations whose published NAVD 88 elevation were originally derived from GPS observations using GEOID96.

Conclusion

Based on the analysis described here the predicted NAVD 88 elevations (w/correction) shown in Table 3 (page 17) and Table 7 (GEOID96 predicted elevation) are deemed to be the most internally consistent estimate of these stations "true" NAVD 88 elevations. It is hoped that the NGS follows through with their effort to modernize the NAVD 88 leveling network in northwest Clatsop County, Oregon, so that this issue may be resolved.